FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 108
No. 2254

FEBRUARY 18, 1960

Registered at the G.P.O. as a Newspaper

Offices: John Adam House, John Adam St., London, W.C.2

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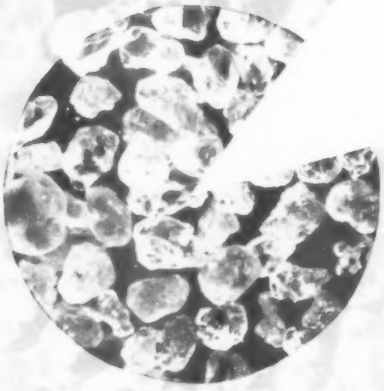

For the finest iron and non-ferrous castings.

Obtainable in four grades of loam and silica sand for oil and CO.2 cores.

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EGLINTON WORKS,
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YOUR REF:
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New Metal Foundry Co., Ltd.,
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Dear Sirs,

We are pleased to announce a reduction of over 20% in the price of our Portable Type Sandslinger.

This has been made possible by extension and re-organization of our erecting shops and we are also able to offer substantial reductions in the prices of all our other models.

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It can be the first step in efficient mechanisation.

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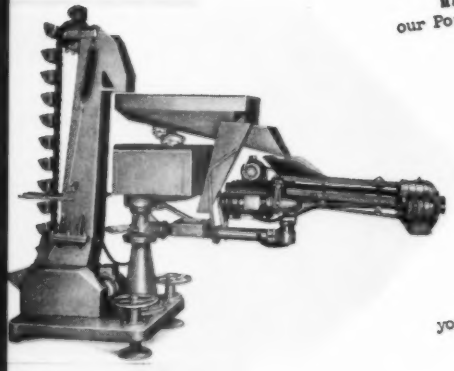
It only requires plugging into the electrical supply.

Mechanisation in the foundry is not expensive.

We would be glad to make you an offer to suit your particular requirements.

Yours faithfully,
FOUNDRY PLANT & MACHINERY LTD.



Sandslinger

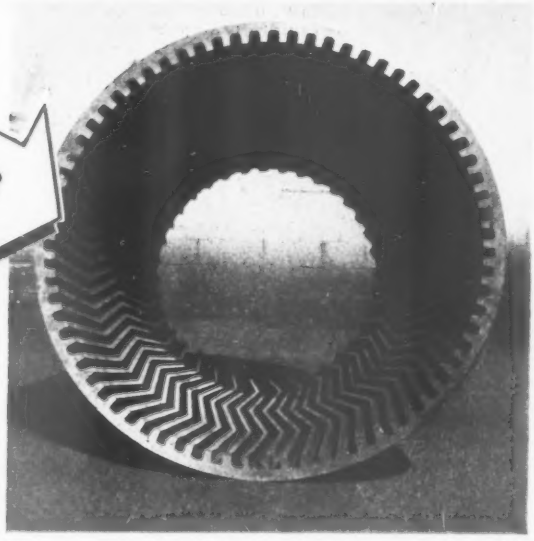
Airset

Fine Cores

COLD
SETTING
Core Oil

Produce Fine Castings

AIRSET
chosen by
MESSRS. BLACK-CLAWSON
INTERNATIONAL LTD.
NEWPORT, MON. for the cores
to make these
fine castings in
NICKEL CHROME STEEL



Ask for Leaflet No. 15.

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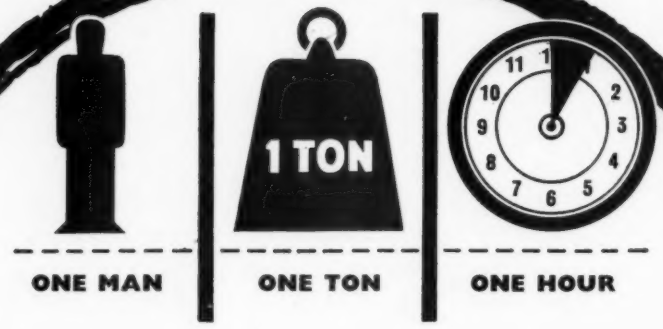
MARKET HARBOROUGH-LEICESTERSHIRE PHONE 2254 · 5 · 6 GRAMS HARMARK · M'HARBORO



A formula for efficient and economical Blast Cleaning.

The Centriblast Airless Rotary Barrel is still unsurpassed for speed and economy in cleaning all types of castings, forgings and fabrications within the limit of its capacity.

May we send you details of our full range of Compressed Air Operated and Airless Blast Cleaning Plant?

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36 in. x 42 in. Airless Rotary Barrel Shot Blast Machine.

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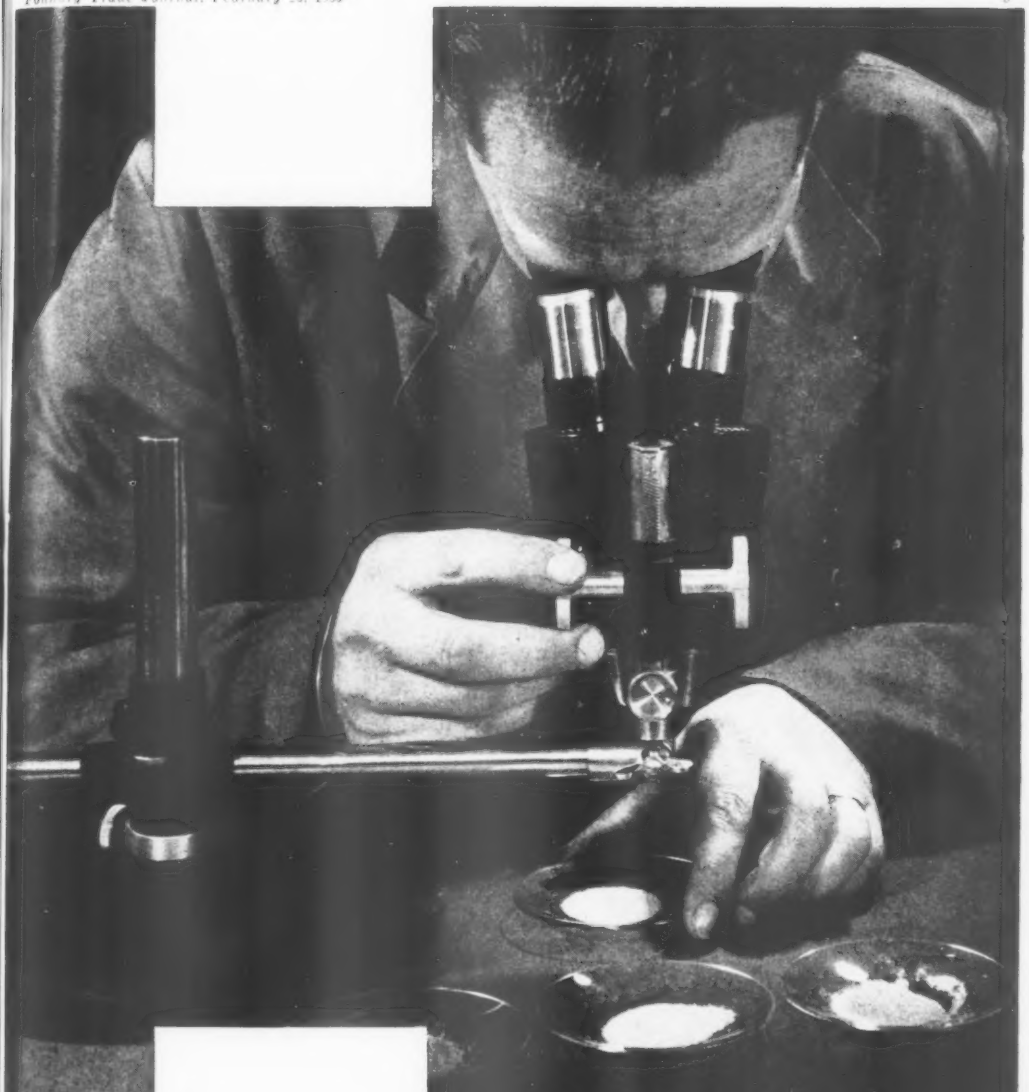

Routine checking of moulding and core sand properties is essential and guarantees improved surface finish of castings, fewer rejects and economical use of sands. The production of quality castings begins with sand testing.
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Sand Testing Equipment.

Easy handling - reliable test results - pleasing appearance.

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Telephone: (053) 5 60 31/5 70 31 Telegrams: Geofischer

GM 1279/4

Staffordshire Landscapes

Scenes such as these are common in South Staffordshire. A century lies between the prime years of the foreground, and the present day development behind.

Though the occupants of the new houses may give little thought to the sunken canal boat, the progress which began its decay may also have brought their forefathers to the district to share, and to play their part in the swelling industrial activity which was growing from the pioneering spirit of the early Iron Masters.

Progress in Staffordshire, bringing almost every major improvement in the technique of iron-founding since 1700, is apparent in the landscape of the County as well as in its products.

For almost a century and a half Pig Iron has been manufactured at Darlaston Iron Works. Today, the most modern methods of metallurgical control of raw materials and the finished product, enables them to supply Pig Iron of consistent uniformity to the most exacting specification.

Bradley & Foster LIMITED

FOR QUALITY CONTROLLED
REFINED PIG IRON

DARLASTON · STAFFORDSHIRE

A member of the Staveley Coal & Iron Co., Ltd., Group.

L.G.B.

The **BLO SHOOTER** will blow or shoot cores and moulds using any sand which can be rammed by hand.

Built in England by

PNEULEC LIMITED, SMETHWICK, Nr. BIRMINGHAM

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by arrangement with **G. CRESCENZI** Turin, Italy,
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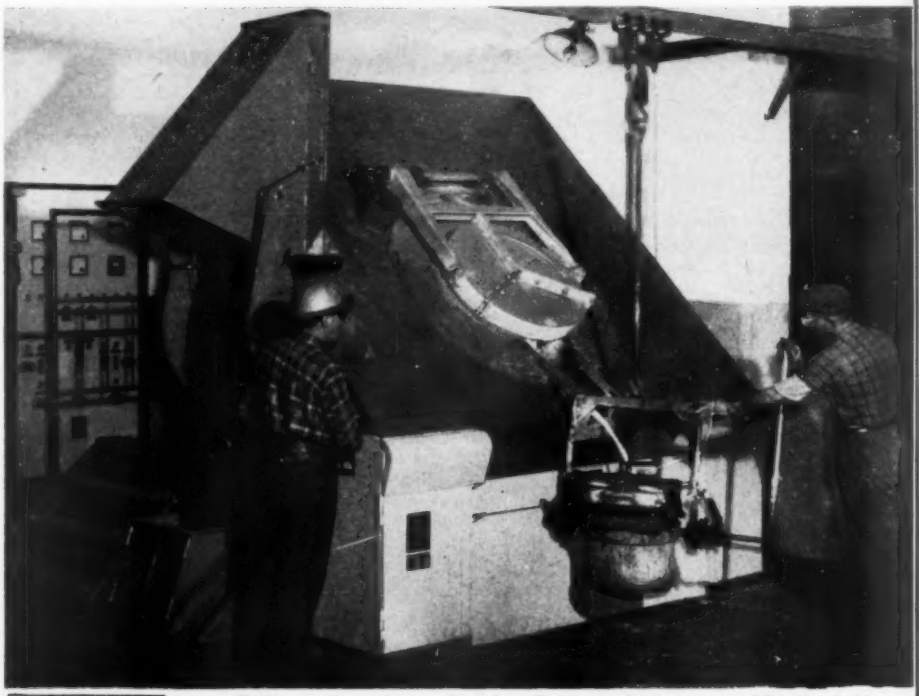
for the production of special irons and steel, reclamation of C.I. borings and recarbonisation of steel scrap.



Roper ~ Crescenzi

● Illustration shows Coreless Furnace, Reference "CSA" of 1½ tons capacity, with a rating of 300 KVA. With these Furnaces metal temperatures up to 1600°C. can be obtained, and continuous or intermittent operation is permissible.

E. A. ROPER & CO. LTD., KEIGHLEY, YORKSHIRE

Telephone: Keighley 4215/6. *Telegrams:* "Climax", Keighley.

J.J.M.

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EQUIPMENT

Fordath Complete Shell Sand Coating Units
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Fordath Core Extrusion Machines
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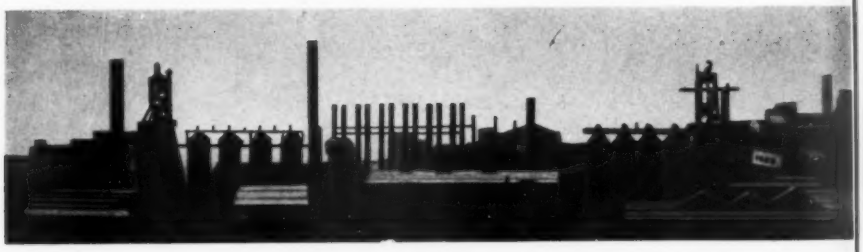
Telephone: WESt Bromwich 1665 (4 lines) Telegrams: Metallical, West Bromwich FD214A

Question which type of dust collection and control plant?



Answer consult Holmes

We have specialised in the design, manufacture and installation of dust collection and control plant for a good many years and today our range is second to none. Plant manufactured by our Gas Cleaning Division includes: Holmes-Elex Electrical Precipitators: Holmes Retroflux and Standard Bag Filters: the Holmes Schneible Multi-Wash System: Holmes-Rothemuhle Multi-Cell Cyclone Dust Collectors and Trion Electronic Air Filters. Enquiries normally entail visits to site by an engineer from our Test and Process Development Section to assess the particular problems involved and their solution in terms of the comprehensive range of plant which is available. Extensive laboratory facilities exist for the examination of dust and fumes, and, where necessary, arrangements can be made for pilot plant to be installed for trial purposes. Detailed technical brochures on all types of plant are available and can be had on request.

W. C. HOLMES & CO. LTD.

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16" – 20" C04 FOUNDRY TYPE ABRASIVE WHEEL CUTTING OFF MACHINE

- ★ UNIVERSAL IN CHARACTER
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- ★ EXTREME SIMPLICITY
- ★ 10, 20 OR 30 H.P. MOTORS AVAILABLE
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- ★ EARLY DELIVERY

This entirely new machine is the culmination of many years experience in this field. Designed expressly for foundry use, risers and gates of up to 3 in. dia. on a wide variety of castings can be cut off neatly in astonishing times.

Why not consult us, we may be able to help you.

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A1

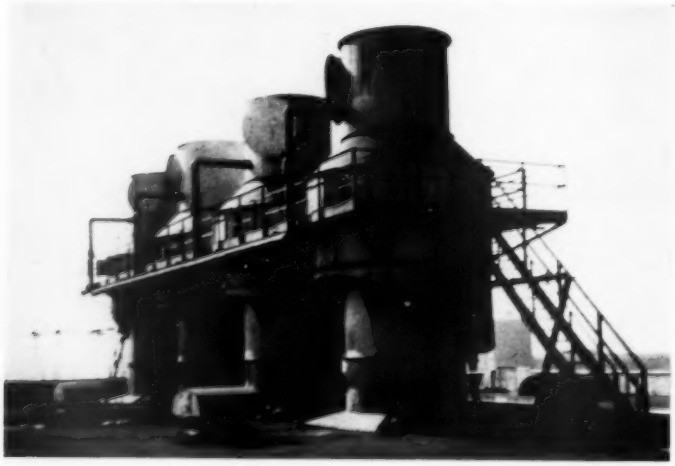
The 'CLEAN AIR ACT' demands EFFICIENT dust and grit suppression

Instal...

TITAN

WET ARRESTERS

Designed by the principal Cupola manufacturers in the U.K. with more than 40 years experience and proven practice in all aspects of Cupola operation.



Many Foundrymen think Wet Spark Arresters are a recent development and because of troubles experienced with some installations, usually caused through bad design, they tend to regard them with suspicion.

We are proud that FORD MOTOR CO. selected **TITAN** Wet Spark Arresters for the **4 TITAN** 30 ton per hour Hot Blast Cupolas which we installed in their new Thames Foundry, the most modern in Europe.

These are illustrated, the second Cupola from the left is " blowing " —note the complete absence of dark smoke, sure proof of efficiency.

Photo completely untouched taken during normal operating conditions.

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- **Reduce Maintenance or Replacement of Gutters, Drains and Roof Sheeting.**
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DESIGNERS & ACTUAL BUILDERS OF EFFICIENT FOUNDRY PLANT

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We invite you at any time to call on the services of our experimental foundry and sand-testing laboratory. Our foundry technicians will be pleased to co-operate in helping you find the solution to sand casting problems. Or if you prefer, they can come to your foundry to discuss a particular difficulty on the spot. These Fulbond services are offered without charge. All details are, of course, treated in strict confidence.

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THE FULLERS' EARTH UNION LTD.

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A MEMBER OF THE LAPORTE GROUP

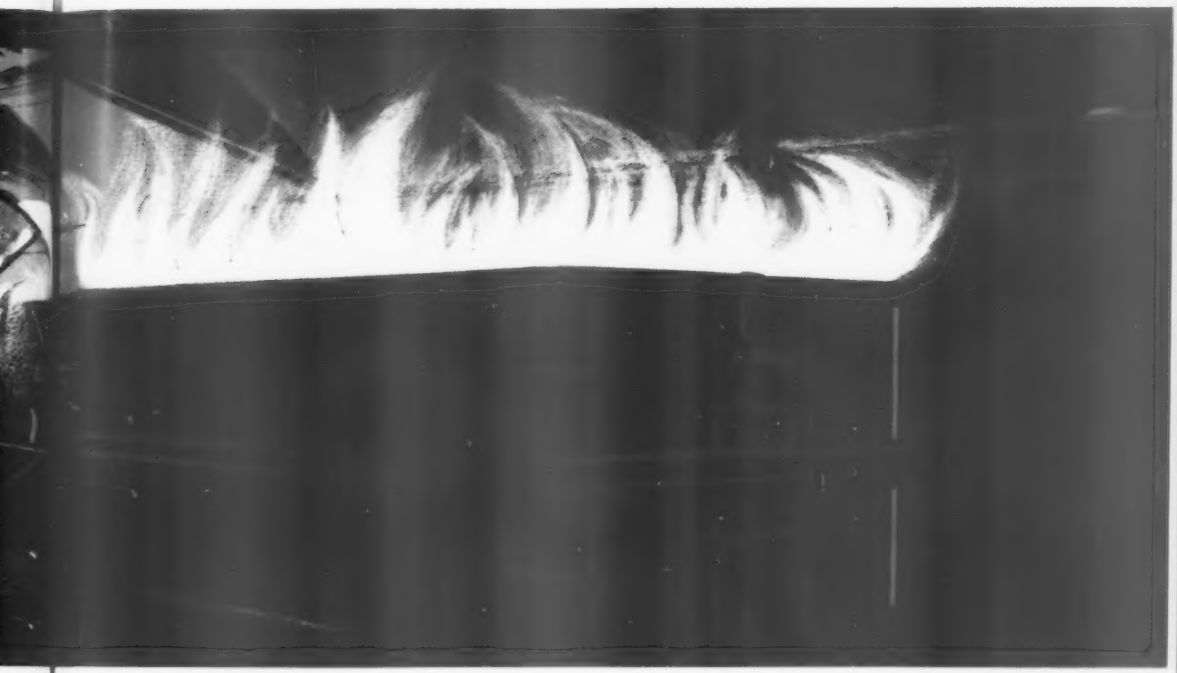
Modern foundry practice calls for boxes able to withstand terrific stress and strain. Sterling boxes can be made to any degree of strength and do not of course crack or break like cast iron. Moreover they can be machined to fine limits on the outside for working against stops.

Sterling
MOULDING BOXES

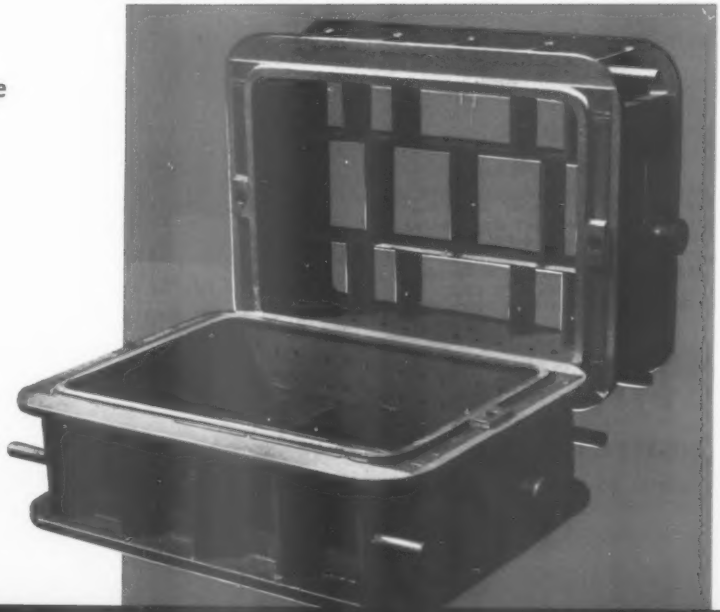
Long life in service, accuracy and assured interchangeability make Sterling the foundryman's first choice.

STERLING FOUNDRY SPECIALTIES LIMITED

Sterling boxes stay on the job!



The box illustrated here is used in a foundry where mechanization has reached a very high standard of efficiency



J.P.M.1

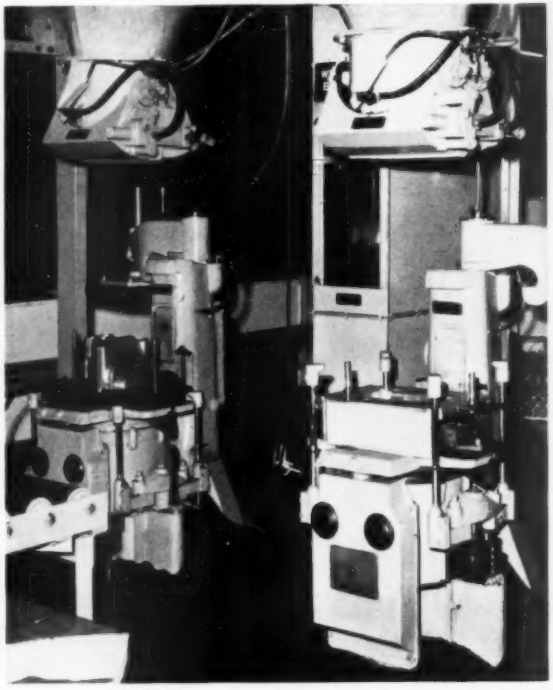
AUTOMATIC
JOLT-SQUEEZE PNEUMATIC MOULDING MACHINE

THE MACHINE WITH THE
15 SECONDS
AUTOMATIC CYCLE

SEE IT OPERATING IN OUR LEIGHTON BUZZARD FOUNDRY

SEND FOR LEAFLET 146

- Automatic head swing, jolt, squeeze and draw.
- Number of jolts, depth of draw and vibration time variable as required.
- 1½" or 3" stroke jolt as required.
- Recommended maximum box 24" × 18".
- Maximum pattern draw 9".
- J.P.M. 2 available for larger boxes (also as non-automatic machines N.A.J. 1-2).
- Roller strip—optional extra.
- No pit required.



A pair of J.P.M.1's, with Pneumatic Hopper Gates, producing very deep moulds (straight draw, no rollover)

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66 B

FASTEST . . .
in its class, this machine out-produces any other moulding machine in the world!

SMOOTHEST . . .
a completely independent oil pump unit ensures powerful, positive and precise operation.

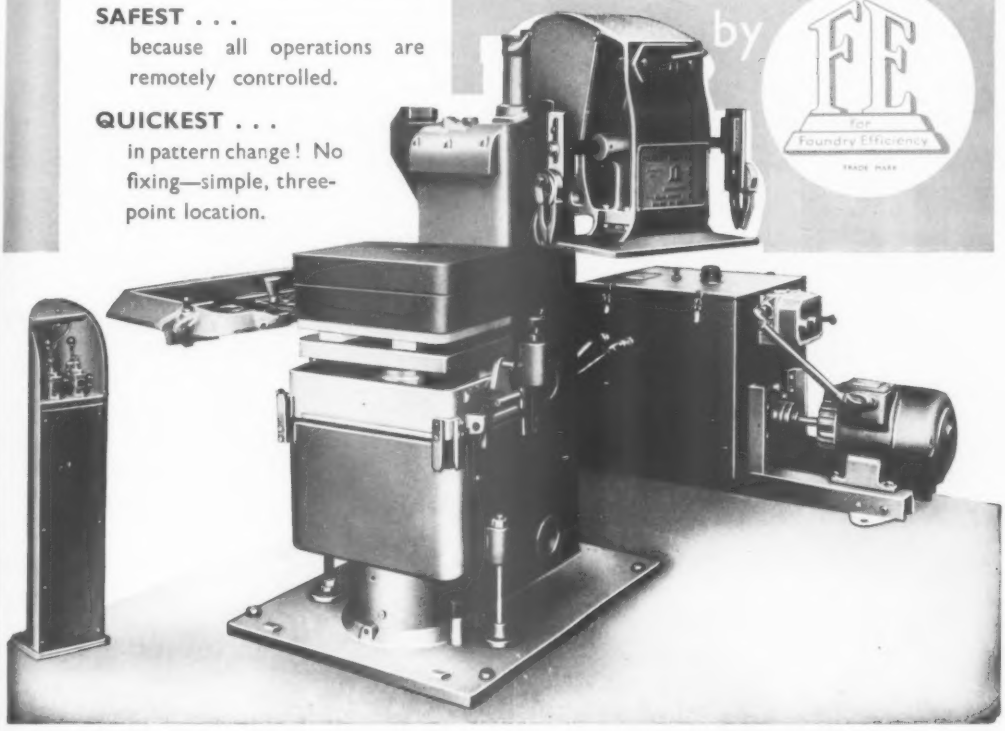
SAFEST . . .
because all operations are remotely controlled.

QUICKEST . . .
in pattern change! No fixing—simple, three-point location.

The H.E.B.-I.

BOXLESS HYDROIL-ELECTRIC HIGH-SPEED MOULDING MACHINE

by FE for Foundry Efficiency



British Patent No. 748551.

SEND TODAY FOR NEW LEAFLET No. 151!

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LEIGHTON BUZZARD · BEDFORDSHIRE · ENGLAND
Telephone: Leighton Buzzard 2441 (5 lines) Telegrams: 'Equipment' Leighton Buzzard

Hey! That's a remarkable month's output. And you're raising it higher? Hold tight! Quicker-one two, one two . . . What? The groinch sprocket snarled up? *!!!+!!?!*—Call in one of those remarkably efficient PECO service teams. Ring MAC . . . Yes, I know. Your name's MAC and mine's Pete PECO. But ring it. MACaulay 1212. M-A-C one two, one two. Help will arrive in a flash. Remember: PECO get you running quicker.

PECO die-casting machines with their large capacity really do achieve phenomenal output. See for yourself. Look at the 'specs'. Platen drawings are included. Telephone now. They'll be on your desk in the morning.

Wir laden alle Erzeuger von Spritzgussteille in Deutschland ein, von dem kontinentalen Notdienst der Firma PECO Gebrauch zu machen. Fernschreiber 2-3312

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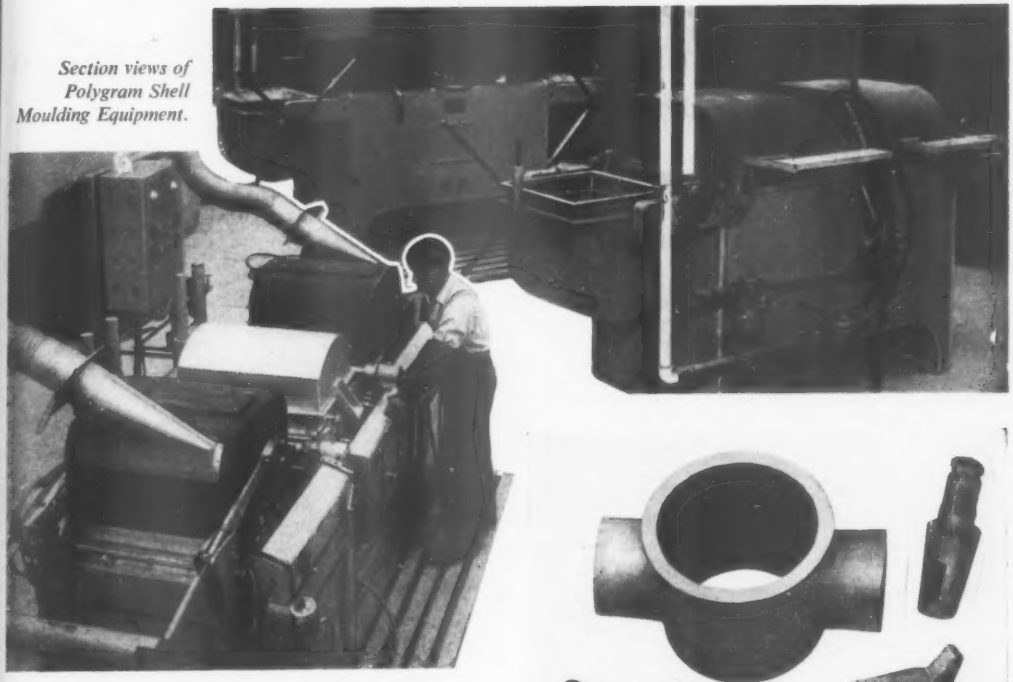
19.0

Polygram.. in the new Steel foundry of Samuel Osborn & Co., Limited

Section views of Polygram Shell Moulding Equipment.



Samuel Osborn & Co., Limited, achieve greater accuracy, soundness and improved surface finish by Shell Moulding a wide variety of castings in Stainless, Acid and Heat Resisting Steels, as well as other High Alloy, Tool, Die and Low Carbon Steels.

A varied range of Shell Moulded Steel Production castings.
Photograph by courtesy of Samuel Osborn & Co., Limited, Sheffield.

Polygram Casting Company have a competent and complete service to offer and your enquiries are invited.

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THE FIRST NAME IN SHELL MOULDING

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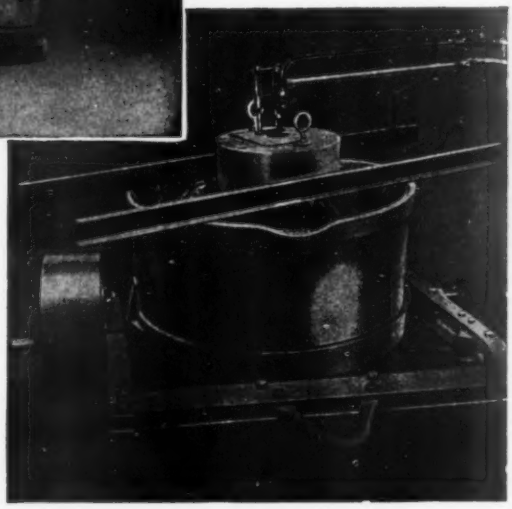
"NEWSTAD"

Gas or oil fired LADLE DRYERS

NEWSTAD Ladle Dryers provide the answers to a difficult foundry problem, speed and efficiency with economy



The Illustration above shows a Gas Fired Installation at the works of Messrs. Sterling Metals, Ltd., Coventry, used for Drying and Preheating Bogey Ladles.

Our oil fired Dryers are also available in sizes to suit all types of ladle from 5 cwt. capacity upwards. Control valves are remote from the burner making control easy and comfortable. As with the gas fired ladle dryer the degree of air and fuel turn down enables one size of dryer to dry several sizes of ladle. A safe and reliable means of drying and pre-heating ladles without smoke fumes or ash.

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5

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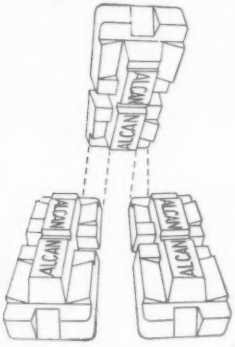
a new form of ingot for easier, speedier, safer handling

ALCAN 'TRI-LOK' *ingots readily separate by lifting, though when stacked they interlock three ways and provide a bundle ready for fast handling by fork lift truck.*



ALCAN (U.K.) LIMITED (specialists in aluminium ingot) have introduced a new and brilliant development in ingot design, the 'TRI-LOK'. This ingenious inter-locking shape enables ALCAN ingots to be stacked more compactly with greater safety and more speed because they 'mate' one to another – and resist lateral and lengthwise displacement. The consequent ease of handling has already given measurable cost savings in loading and storage operations to many ALCAN customers.

ALCAN
TRI-LOK

For further details write to

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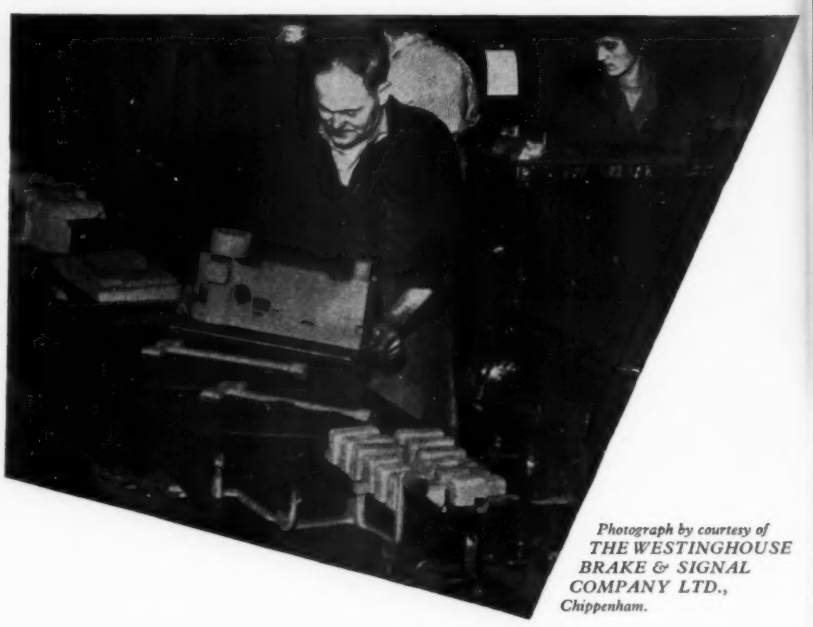
ALCAN
ALUMINIUM LIMITED OF CANADA

TBW/T2

BIS *can help with your Sand problems*



Photograph by courtesy of THE WESTINGHOUSE BRAKE & SIGNAL COMPANY LTD., Chippenham.

These leaflets may interest you— they will be sent free on request

BRITISH INDUSTRIAL SAND LIMITED · FESLENTE LIMITED

Producers of Industrial Silica Sands *Resin-coated Sands*

HOLMETHORPE · REDHILL · SURREY · REDHILL 1122

let's clear the air!

You must admit – the air in foundries, rolling mills, even general factories – gets thickish at times. And unpleasant working conditions do not help production. But if you put in Hills industrial ventilators you've only to touch a button and louvres open to the sky. Fumes and stale air are drawn off. Fresh air is drawn in. Natural daylighting is increased. And output goes up.

Hills technical department will be pleased to call on you to discuss your problems.

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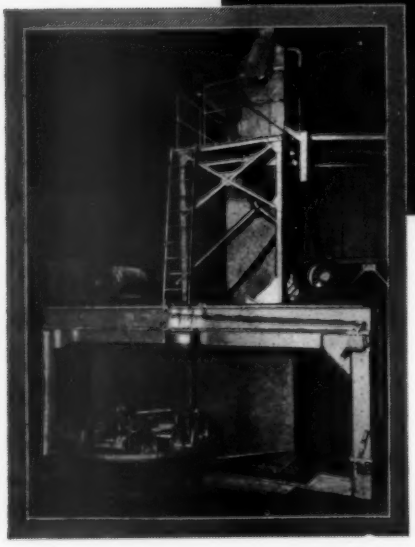
Branches at: Manchester, Bristol, Newcastle-on-Tyne, Glasgow.

V3

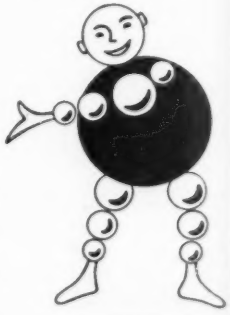
TILGHMAN'S Dual Swing Table Wheelabrator Plant

using W[illegible]



The plant illustrated is a 6ft. Dual Swing Table Wheelabrator installed at Messrs. Jarrow Metal Industries Ltd. It is engaged in cleaning a miscellaneous load of steel castings and the cleaning cycle is eight minutes. This type of plant enables one table to be unloaded and reloaded whilst the other table is under the blast stream and each table is capable of carrying two tons.

LESS THAN FIVE TONS OF STEEL SHOT CONSUMED IN 6 MONTHS



This plant was installed in November, 1956 and in May, 1957 had not used all of the 5 tons of S.460 WHEELABRATOR Steel Shot delivered.
In the first few weeks of operation the machine was working three shifts per day in order to catch up on production, but is now employed on a 44-hour week only. During five weeks of the early period, 250 tons of steel castings were Wheelabrated and maintenance replacements in this time amounted to one set of blades and one deflector plate.

TILGHMAN'S LIMITED · BROADHEATH · ALTRINCHAM · CHESHIRE

A member of the Staveley Coal and Iron Co. Ltd. Group.
LONDON OFFICE: 1 Chester Street S.W.1.

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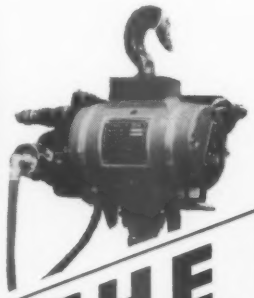
SCOTLAND.—Balbardie Ltd., 227, Bath Street, Glasgow, C.2; 110, Hanover Street, Edinburgh 2.
NORTHERN IRELAND.—Stewart Industrial Services Ltd., 129, Ormeau Road, Belfast.

W161



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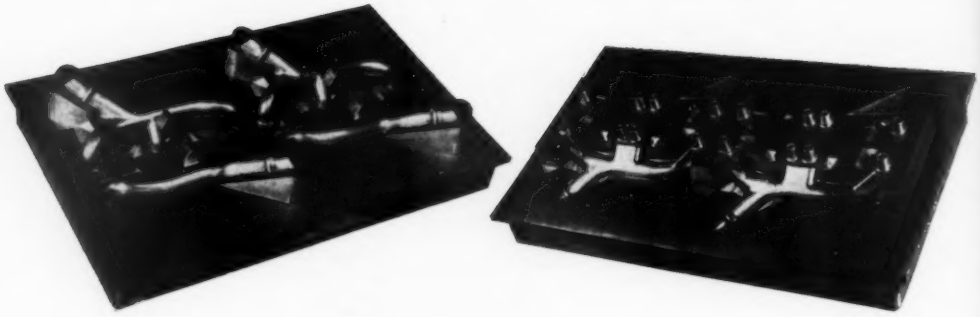

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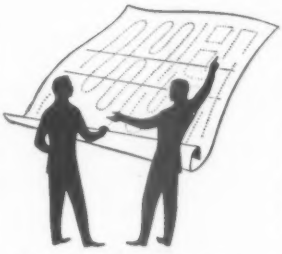

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Areas of almost any size, with a span of up to 200 feet, can be served with a single long span Underslung Crane from British MonoRail. Loads of up to 5 tons can be moved with precision to any point in any place within a factory's cubic area. These long span cranes need little headroom, and are light and flexible to handle. Their versatility and power of coverage lifts awkward handling problems of every type from the factory floor.

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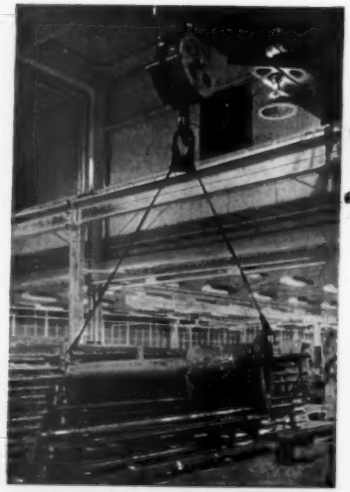

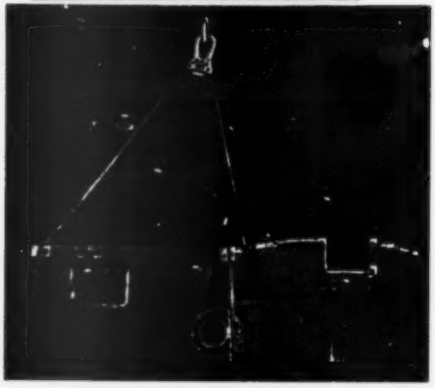

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The **ADJUST-A-LEG** Equalizing Sling is ideal for handling balanced and unbalanced loads efficiently, speedily and with complete safety. When the sling legs are secured to the load and lifting starts, the sling legs lock automatically. Should many identical loads be lifted, fixed sling leg lengths are desirable, this is arranged for by a simple adjustment.

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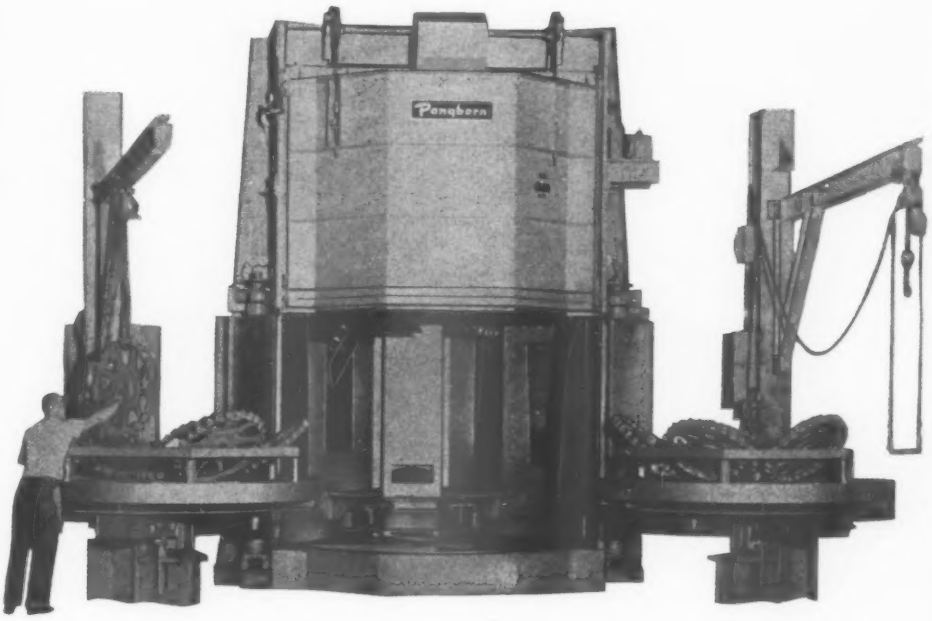

illustration of 8′ 0″ diameter

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AIRLESS SHOT BLASTING MACHINE

with guaranteed 10,000 lb. loading capacity each table

MAXIMUM WORK

Machine	Dia.		Height		Weight
4 LM	4′ 0″	×	2′ 0″	×	2,000
6 LM	6′ 0″	×	3′ 0″	×	4,000
8 LM	8′ 0″	×	3′ 6″	×	10,000
8 LM-1	8′ 0″	×	5′ 0″	×	12.000

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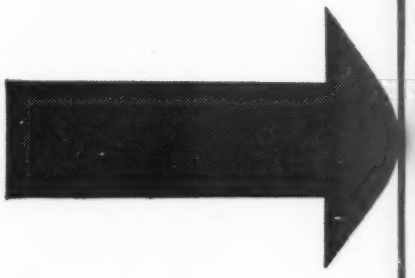
WAKEFIELD

Steel's first 'Report to the Nation'

The British Iron and Steel Federation is adopting a new approach to the public in a series of advertisements in the national and provincial press entitled REPORT TO THE NATION. These advertisements, as they appear, will deal with current news of the steel industry. The first report is concerned, among other things, with the industry's production record and development plans; with some of the latest uses of steel; and with the social conditions of workers in a typical steel producing area. Future reports will explore other sides of the industry: the personalities running it; research activities; management training.

The first report has already appeared. It will be followed by others at intervals during the year, and almost everyone in the country will have a chance to see them. In this way, people can learn not only how a vital industry operates, but also how closely the prosperity and everyday life of the nation is bound up with that of Steel. The Reports will be important, too, in helping those within Steel to know it better, and to realise they're part of an efficient, progressive and booming industry.



STEEL – NEW YE… TO THE N…

HOW MUCH STEEL IN 1960?

THE British steel industry may well produce about 24 million tons of steel in 1960—compared with 20 million tons last year.

Last year, and the year before, the steel industry spent some £100,000,000 on new plant and development—and raised its production capacity by about a *million* tons each year. This was done despite the fact that existing capacity, except in a few cases, was not being fully used.

Why this expansion, then? Is it an act of folly—or farsightedness? It is simply an expression of confidence in Britain's future.

Apart from the sharp set-back around 1958, when the industry was working far below capacity, demand for steel has shown a steady upsurge since the war. Looking forwards, the industry has weighed forecasts made by its customers about their future demand.

As a result the industry believes that the trend of steel demand will continue to rise.

Planning ahead in Steel is a ticklish business. It means foreseeing future developments in the economic life of the nation, and the changing needs of steel consumers.

Among the thousands of steel-using firms the pattern of demand can change almost overnight. But planning, building and bringing into production a new steelworks inevitably takes years.

UNEXPECTED

A plant making rails cannot change over to production of sheet for cars.

Hence in the past two years, although the steel industry as a whole has not been working at full capacity, there have sometimes been shortages of steel sheet.

Why? The causes were an unexpectedly swift boom in cars – which took even the motor industry itself by surprise; rising sales of household goods like cookers and washing machines, and of electrical machinery; and a shift in demand from one kind of steel sheet to another.

£760 MILLION

Not even the wisest brains can predict, years ahead, every future shift in the pattern of demand. But Britain's steel industry has done remarkably well since the war in having the right plant ready at the right time.

Since the end of 1946, a sum of over £760,000,000 has been spent on development. The graphs show the crescendo of expansion in the last seven years: and also how the steel industry, far from lagging, has gone ahead faster than other manufacturing industries.

NEW MILLS

In the critical field of cold reduced sheet, production in 1959 was 13%, up on 1958, and will rise again by perhaps as much as 20%, in 1960. Further expansion at existing strip mills and construction of two new mills at Newport and Ravenscraig, work on which is being accelerated, will meet the likely demand for sheet and tinplate.

What of the other sections of the industry? Although hit by the recession, they have pressed on with expansion. The new Universal Beam Mill at Lackenby, best of its kind in the world, is in production – indeed, everywhere the nationwide programme of steel development is accelerating. At the lowest point (December, 1958) the industry was operating, on average, at about 70%, of capacity. Now the rate is over 90%, – of a greater capacity.

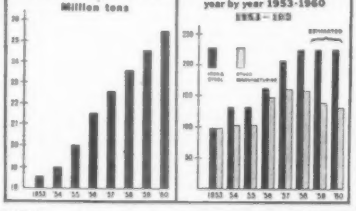
UP AND UP

Prospects are that there will still be some margin of capacity in 1960 in certain heavy steel products, as a result of continued slackness of demand from railways, coal mines, and shipbuilders. But demand for other types of steel is expected to rise still further.

Steel production in 1960 may therefore be between three and four million tons more than in 1959.

Continued modernisation and expansion – at a cost of over £100 million a year – will provide an efficient steel capacity of over 30 million tons by 1965, a sound basis for competing in world markets.

SEVEN YEARS OF STEADY PROGRESS



SIXTY KINDS OF STEEL ON T…

Steel takes these shock

THEY do brutal… things to a car, down at Nuneaton, on the proving grounds of the Motor Industry Research Association. And every time they test a car, sixty different kinds of steel are on trial. That's how many there are in a modern car.

One of the tortures have devised consist… pavé track made of … stone blocks, set … angles, with pier… pot-holes. They h… drive cars across it.

And what bears brunt of this savage …

Fifty

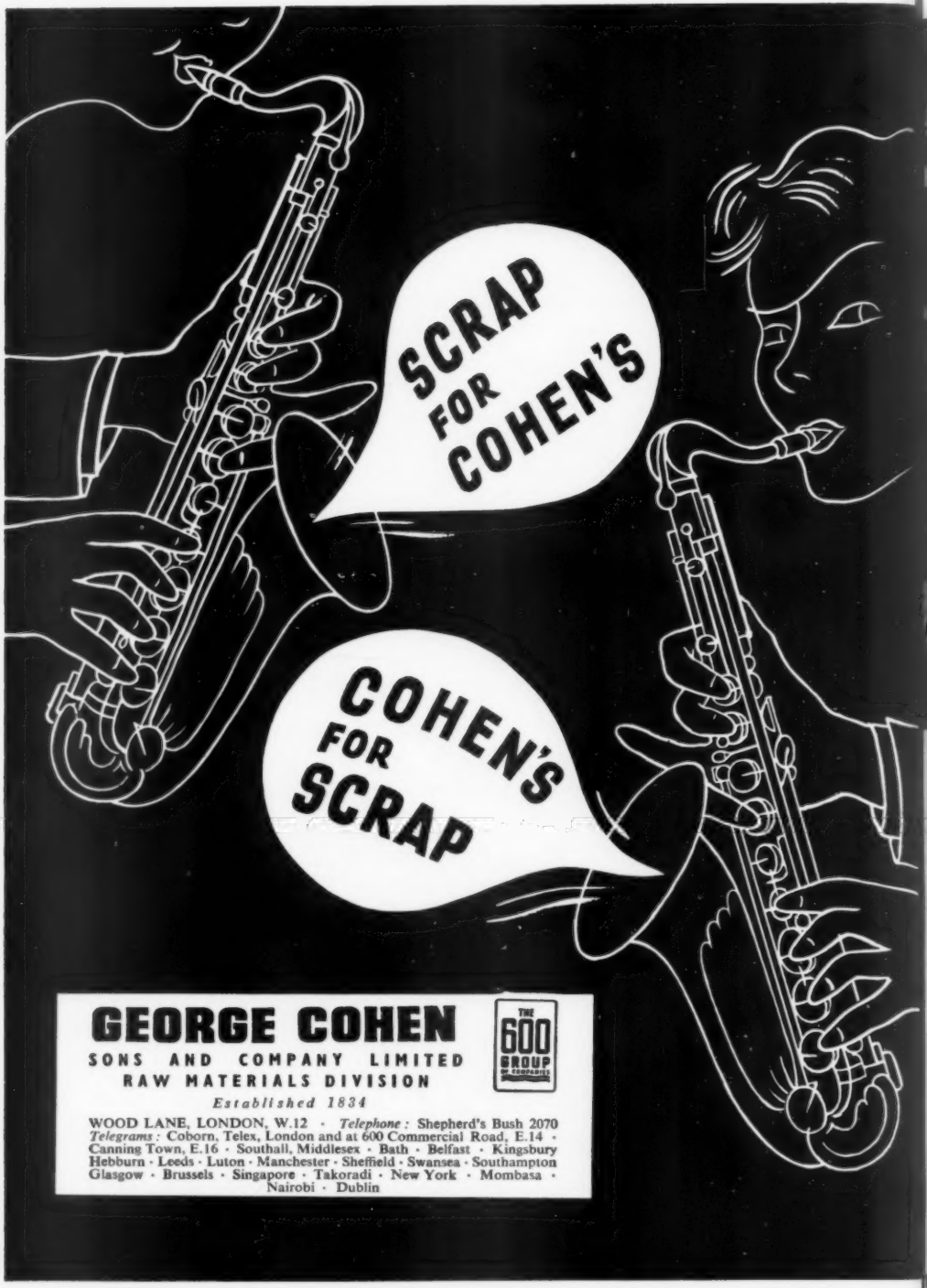
New life in the Valleys

BY TREVOR EVANS

THE "black years" of the 'twenties and 'thirties are not yet forgotten in South Wales. So it was with deep misgivings that I went back to the village where I grew up.

I was never so surprised in my life. I rubbed my eyes, thinking for a moment that I had driven into the wr…

THE BRITISH IRON AND STEEL FEDERATION



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SKLENAR furnaces give quick melts (500 lb. brass in 35 minutes) with low metal losses (maximum under 2 per cent.). Finger-tip control of atmosphere for melting non-ferrous metals is standard.

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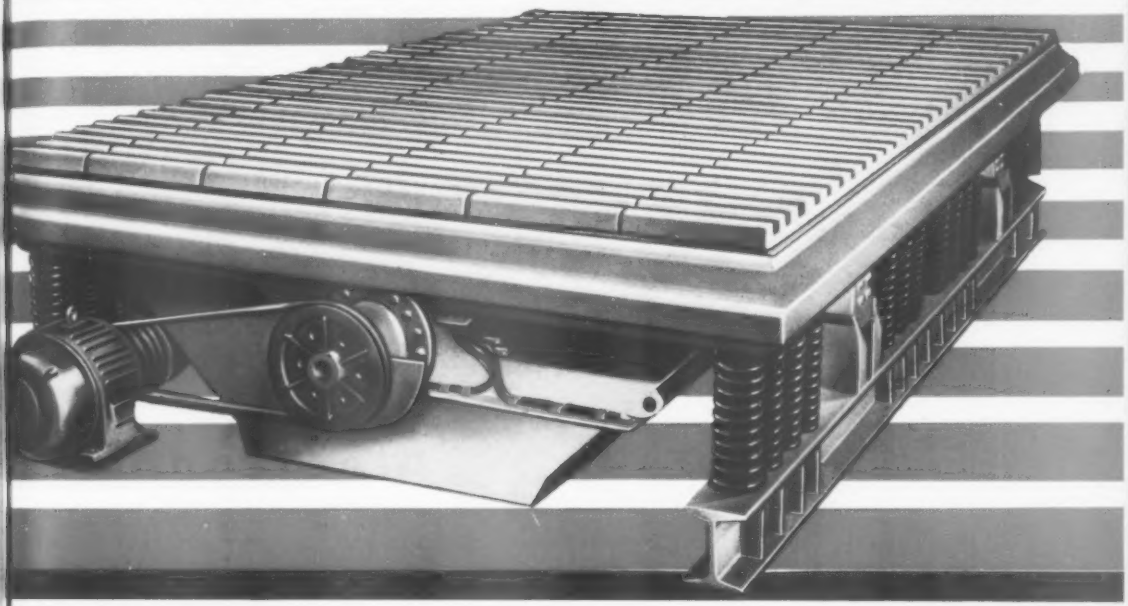

THE HEWITT-ROBINS

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AS SUPPLIED TO THE FORD MOTOR COMPANY'S THAMES FOUNDRY

s a distinguishing feature of FLOATEX Shakeouts that the vibrations, whilst fast and rough, are developed without shock. This has the double advantage of preventing damage the face of the moulding box, and also of being kind to the castings. Furthermore, the ations themselves are fully absorbed by supporting springs and are thus prevented from ching the foundations. Only simple foundations are therefore required. Sizes range n a single unit 2ft. by 2ft. up to a sextuple unit 17ft. by 34ft., capacity 150 tons. The size trated is a 12ft. by 10ft. duplex unit, capacity 45 tons. Floatex Shakeouts can be neered into any existing Foundry Layout. Enquiries are invited.

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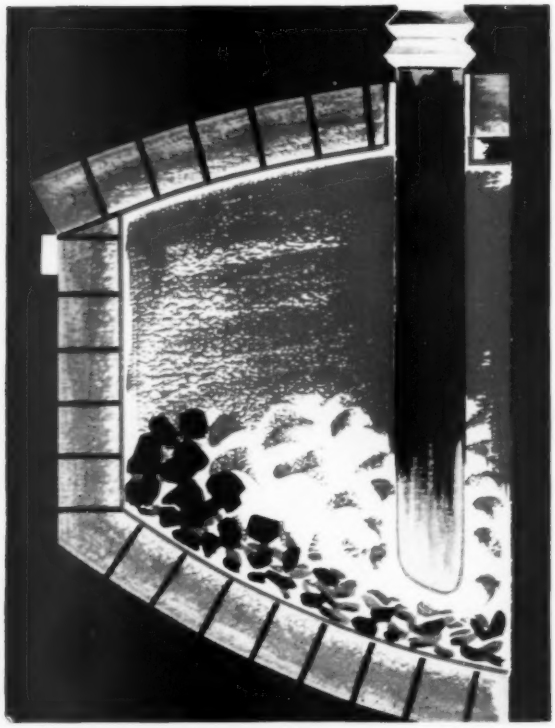

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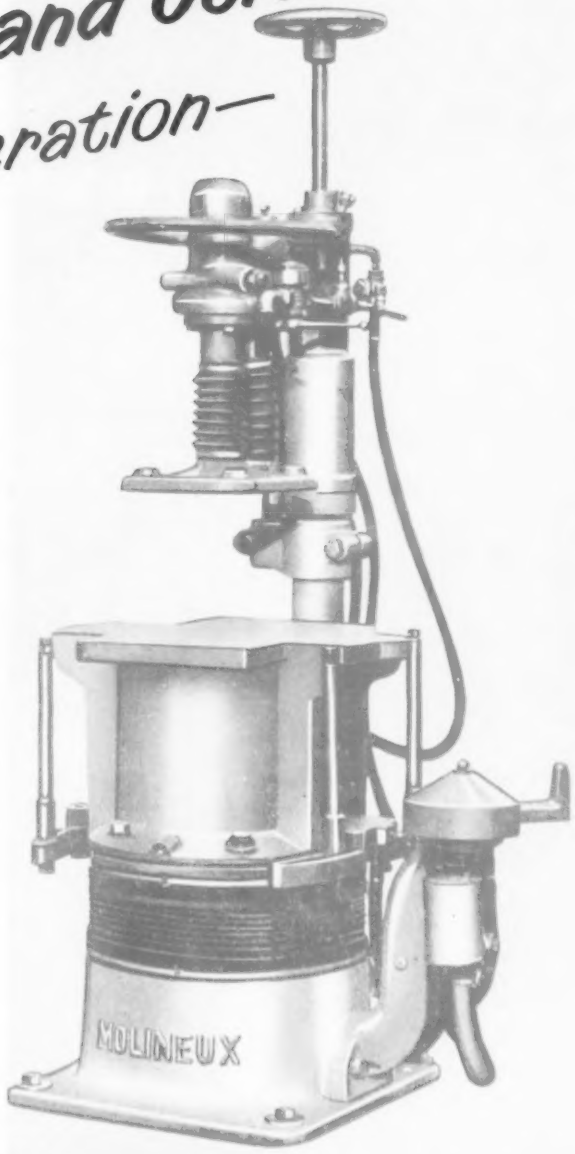
Cuts operating times—
improves mould quality

MOLINEUX MOULDING MACHINE

or the deep difficult job



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Marlborough Works, Marlborough Rd., London, N.19
Phone: ARChway 4127

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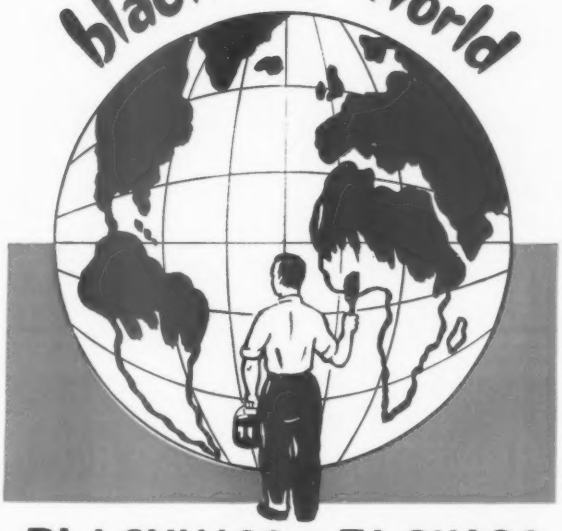

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ORGANIZATION OF THE UK FOUNDRY INDUSTRY

The foundry industry of the United Kingdom is represented by the following organizations, many of whose proceedings are regularly reported in this JOURNAL:—

Ironfounding Employers' Associations

COUNCIL OF IRONFOUNDRY ASSOCIATIONS

Chairman: **M. J. Glenny,** Dover Engineering Works, Limited, Talbot House, Arundel St., London, W.C.2. *Director:* **K. Marshall.** *Ass. Director:* **J. W. Butler.** *Secretary:* **D. L. Farrant,** 14, Pall Mall, London, S.W.1. 'Phone: WHitehall 7171. *Participating Associations:* British Cast Iron Research Association (affiliated); Institute of British Foundrymen (affiliated); and the following:—**Association of Automobile and Allied High-duty Ironfounders.** Secretaries, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15. 'Phone: Edgbaston 4141. Grams: "Clarify," Birmingham, 15. **British Ironfounders' Association and British Bath Manufacturers' Association.** Director and Secretary: J. Galbraith Sneddon, C.A., 145, St. Vincent Street, Glasgow, C.2. 'Phone: Central 2891. 'Grams. "Groundwork," Glasgow. **British Grit Association** (affiliated).—Secretary: J. Campbell MacGregor, 10, Bank Street, Airdrie, Lanarkshire. **British Malleable Tube Fittings Association.**—Secretary: F. B. Ridgwell, 196, Shaftesbury Avenue, London, W.C.2. 'Phone: TEMple Bar 6052-3. 'Grams: "Brimatuffa," London. **Cast-Iron Chair Association.**—Secretaries: Peat, Marwick, Mitchell & Co., The Cast Iron Chair Association, Queen's Square, Middlesbrough, Yorkshire. **Cast Iron Axlebox Association and National Ingot Mould Association.**—Secretaries: Peat, Marwick, Mitchell & Company, 301, Glossop Road, Sheffield. 'Phone and 'Grams: Broomhill 63031. **Cast Iron Heating Boiler and Radiator Manufacturers' Association.**—Secretary: Stanley Henderson, 69, Cannon Street, London, E.C.4. 'Phone: CITy 4444. **British Cast Iron Pressure Pipe Association.**—Secretary: W. I. Campbell, 14, Pall Mall, London, S.W.1. 'Phone: WHitehall 7941. **Cast Iron Segment Association.**—Secretary: W. Rose, Stanton Ironworks Company, Limited, P.O. Box 3, near Nottingham. **Greensand Pipe Founders' Association.**—Secretaries: McClure Naismith Brodie & Company, 77, St. Vincent Street, Glasgow, C.2. 'Phone: Glasgow 9476. 'Grams: "Lycidasm," Glasgow. **National Association of Malleable Ironfounders.**—Secretary: Miss L. Verity, M.B.E., Chamber of Commerce Offices, Tudor House, Bridge Street, Walsall. 'Phone: Walsall 5671. **National and Midland Ironfounders' Association.**—Acting Secretary: F. W. Sims 69, Harborne Road, Edgbaston, Birmingham, 15. **Roll Makers Association of Great Britain.**—Secretaries: Peat, Marwick, Mitchell & Company, Beaufort House, Newhall Street, Birmingham, 3. 'Phone: Central 6661-3.

NATIONAL FEDERATION OF ENGINEERING & GENERAL IRONFOUNDERS

Chairman: **R. Laroux Handley,** Ferranti Limited, Hollinwood, Lancs. *Secretaries:* **Mann, Judd & Co.,** 8, Fredericks Place, London, E.C.2. **Constituent Associations:** Ironfounders' National Confederation and National Ironfounding Employers' Federation.

IRONFOUNDERS' NATIONAL CONFEDERATION

Chairman: **F. D. Drake,** Drakes (Engineers), Limited, Ovenden, Halifax. **Secretaries: H. Overton, Salt & Company,** 12th Floor, City Centre House: 30, Union Street, Birmingham, 2. 'Phone: Midland 8427. **Branch Associations:** *East and West Ridings.*—Secretary: C. L. Carver, Ellerby Foundry, Ltd., Ellerby Lane, Leeds, 9. *London, Home and Eastern Counties.*—**Secretaries:** H. Overton Salt & Company, 30, Union Street, Birmingham, 2. *Midlands.*—Secretary: V. L. Nicholls, Grazebrook Foundry Limited, Blower's Green, nr. Dudley, Worcs. 'Phone: Dudley 2431. *North Midlands.*—Secretary: C. W. Hicks, Rolls-Royce, Limited, Nightingale Road, Derby. *North Western.*—Secretary: P. E. F. Crawdson, Gilbert, Gilkes & Gordon, Ltd., Canal Ironworks, Kendal, Westmorland. 'Phone: Kendal 28.

NATIONAL IRONFOUNDING EMPLOYERS' FEDERATION

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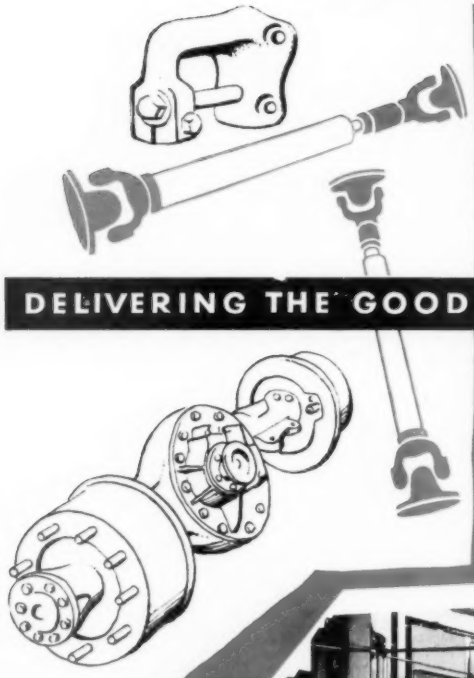

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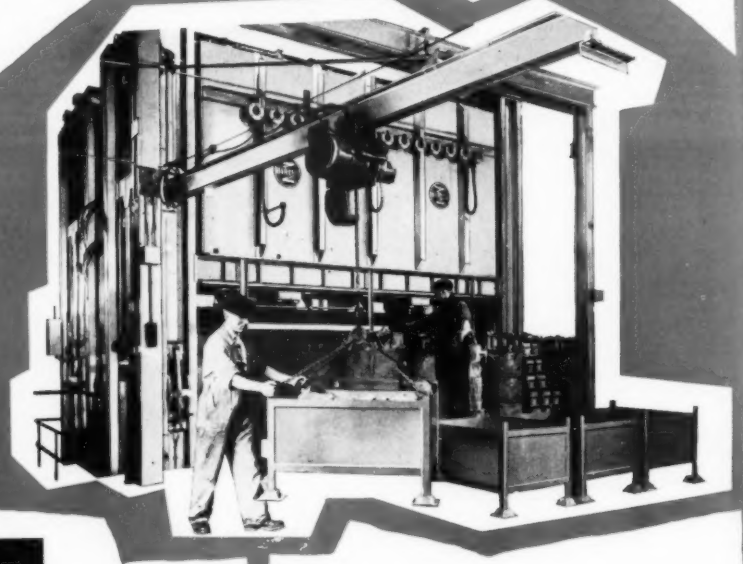

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FOUNDRY TRADE JOURNAL

Vol. 108. February 18, 1960 No. 2254

Established 1902

Incorporating

IRON & STEEL TRADES JOURNAL

Single copy 1s.; by post 1s. 4d. Annual subscription: home 52s. abroad 60s. (prepaid)

Editor:
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The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; the Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association; and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Every Thursday by Industrial Newspapers, Limited

BARRINGTON HOOPER, C.B.E., *Chairman and Joint Managing Director*

F. BARRINGTON HOOPER, B.A., *Joint Managing Director and Commercial Director*

F. R. LEWIS, JOHN HOOPER, D. HORN *Directors*

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JOHN ADAM HOUSE, 17-19, JOHN ADAM STREET, ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 (Private Branch Exchange)

Telegraphic Address: "Zacatecas Rand, London"

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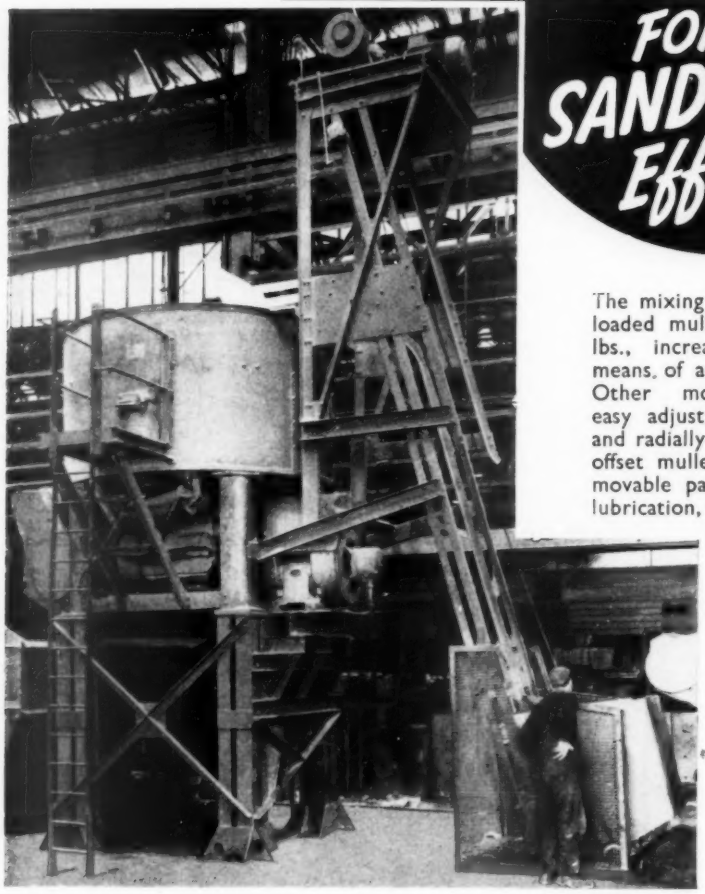
August-Simpson MIX-MULLERS FOR SAND MIXING Efficiency



The mixing unit incorporates spring-loaded mullers, each weighing 1,600 lbs., increasing to 4,000 lbs. by means of adjustable spring pressure. Other modern features include easy adjustment of plows vertically and radially by positive screw device; offset mullers; sand sampler; removable panel in crib; centralised lubrication, etc.

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J.J.M.

FOUNDRY
TRADE JOURNAL

Vol. 108 FEBRUARY 18, 1960 No. 2254

The Crowther Report

The report* of the Central Advisory Council for Education (now known as the Crowther Report), is indeed far reaching in its implications on the future of education in this country. Its main recommendations, so far as industry is concerned, are: (1) The compulsory raising of the minimum school-leaving age to 16 in 1966, 1967 or 1968; (2) the introduction as soon as possible of legislation to substitute two school-leaving dates each year—Easter and July—for the present three (Easter, July and Christmas); (3) a planned programme of experimentation leading to the introduction in the early 1970's of compulsory part-time education for all boys and girls of 16 and 17, who are not already in full-time education, and (4) a greater degree of integration between schools and further education; the provision of more time for all courses, especially "sandwich courses" (instead of part-time day-release courses) for all those studying at technician grades.

The raising of the school-leaving age will probably be beneficial to the mechanized foundries, but will not be welcomed by the jobbing shops, as in general the young people who are likely to choose employment in the latter type of foundries are keener to learn a trade than their more sophisticated and slightly older brothers. To fill vacancies for their various types of technicians, mechanized foundries do require youths with a better educational background. The date—at the earliest, 1966—at which the change will take place, will in any case follow the end of the "bulge" in school-leavers. The idea of twice-yearly school leaving periods is an improvement from the educationalists standpoint, but would make industrial absorption more difficult. The third suggestion that of part-time education—if it be the same as day-release—merely confirms what has previously been legalized but never implemented. The reasons for this state of affairs are that there is neither sufficient room in the schools nor are the requisite number of teachers available. However, the next suggestion, the extension of sandwich courses, will make part-time releases obsolete.

From one angle, which can be supported statistically, the implementation of the Crowther Report, would go far to eliminate the waste of time and money arising with lads who embark on a course (be it evening study or part day-time release) and who fail to stay the course. Already in some technical colleges, a student is interviewed before embarking on the SI courses and if he is not up to the standard requisite for him to benefit from pursuing a course of study, he is sent to an attached school for further tuition. Another matter referred to in the Report, is that teachers in technical subjects, though qualified in their own profession, often lack knowledge of the art or science of teaching. This, too, is receiving attention by the larger technical colleges, but still requires development. Because *gradualness* of change is recognized in the Report, it has generally been well received.

* "15 to 28," Vol. 1, obtainable from H.M. Stationery Office, or through any bookseller; Price 12s. 6d. net.

Dinners

INSTITUTE OF METALS

The Prime Minister (the Rt. Hon. Harold Macmillan, P.C., M.P.) has accepted an invitation to be the Institute of Metals' principal guest at the annual dinner this year and to propose the toast of "The Institute and the Non-ferrous Metal Industries." The dinner, at which the newly-installed president, Sir Ronald Prain, O.B.E., HON.M.I.M.M., will preside, will be held at Grosvenor House, Park Lane, London, W.1, on Thursday, March 31, at 7 for 7.30 p.m. The United States ambassador (his excellency John Hay Whitney) has agreed to respond to the toast of "The Guests." Among many other distinguished personages who have accepted invitations to the dinner are: The Belgian, French and Italian ambassadors and their ladies; the High Commissioner for Australia and Lady Harrison; the High Commissioner for Rhodesia and Nyasaland and Lady Rennie; Viscount Chandos; Viscount and Viscountess Knollys; Lord and Lady Barnby; Lord McGowan; Lord and Lady Robins; Air Chief Marshal Sir Thomas and Lady Pike; General Sir Alan and Lady Cunningham; Sir George and Lady Abell; Sir Alexander Fleck; Sir Charles and Lady Hambro; Sir Cyril and Lady Hawker; Sir Frank Lee; Sir Edgar Sengier; Sir Arthur and Lady Smout; Sir Vincent and Lady Tewson; Sir Edward and Lady Wilshaw; the presidents of allied societies, and presidents and chairmen of research and trade associations, with their ladies. It is expected that there will be a very large attendance at this function, for which accommodation for 1,000 is available. At the conclusion of the dinner, members and their guests may dance until 1 a.m.

Tickets are priced at 45s., including coffee, and tables may be reserved for parties of eight to twelve.

FOUNDRY COKE MERCHANTS' ASSOCIATION

A very large number of guests—most of them founders—were entertained by members of the Foundry Coke Merchants' Association on Thursday of last week at their 11th annual banquet in the May Fair Hotel, London. From the total attendance of about 260, the following formed the top table: Mr. J. William Bell (chairman), Prof. James White, D.SC., PH.D. (president, Refractories Association of Great Britain), Sir Charles Fitton (chairman, Pig Iron Merchants' Association), Mr. Arnold Carr, and Mr. E. Tasker (both past-chairman, FCMA), Mr. R. H. Thornley, Mr. N. P. Newman, C.B.E., J.P. (president, Joint Iron Council), Mr. J. I. Willis, Mr. F. Wilkinson, Mr D. E. Baird, Mr. R. J. McDonald, Mr. W. J. Burton, Mr. J. Y. Feggetter, Mr. Barrington Hooper, C.B.E., Mr. K. Marshall (director, Council of Iron-foundry Associations), Mr. C. F. Sullivan, and Mr. W. Armstrong. After "The Queen" and an interval for cabaret, the toast of "The Guests" was proposed by Mr. Bell and replied to jointly by Prof. White and Sir Charles Fitton. The toast of "The Association" was subsequently proposed by Mr. K. Marshall and Mr. L. J. Hopkins replied. Further cabaret turns concluded a most enjoyable evening.

THIS YEAR, students from the National Foundry College, Wolverhampton, are to tour Denmark. During the period from Monday, May 23, to the following Saturday, a number of Danish foundries will be visited by the party, including Burmeister & Wain, Copenhagen; A/S De Forende Jernstoberier, Frederiksverk; A/S Frederiksund and Maskinfabrik, Frederiksund; A/S Allerups Efterfolgere, Odense; A/S H. Rasmussen, Odense; Jernstoberiet Dania, Aarhus, and A/S Varde Stahlverk, Varde.

Another Golden Jubilee

On February 8, the Skefko Ball Bearing Company Limited, Luton, celebrated the 50th anniversary of the formation of the company. To mark the occasion, the board has voted £100,000 to be used to augment the social welfare of the employees and the publicity department has published a special issue of their house magazine *Inner Ring*. This is addressed also to the employees and it is made interesting for them by recalling the principal events of each year in the history of the company by illustration and story. The growth of this concern has been so continuous that there was but little difficulty in finding something worth recalling in each year. The most interesting picture is for 1940, which shows the official Luftwaffe aerial photograph of the works. Fortunately, the worst that happened to the Luton works during the war, was a near miss. The final pages show, by graphs and maps, the great growth and present position of this great Anglo/Swedish organization.

Forthcoming Events

FEBRUARY 23

Society of Instrument Technology

"Backscatter Method of Wall-thickness Measurement," by D. F. White, and "Ultrasonic Resonance Method of Wall-thickness Measurement," by M. V. James, 6.30 for 7 p.m., at Manson House, 26, Portland Place, London, W.1.

Combustion Engineering Association

North-western region: "Refractories for Kilns and Furnaces," by N. W. Hinchliffe, 2.30 p.m., at the Engineers' Club, Albert Square, Manchester.

FEBRUARY 24

Manchester Metallurgical Society

"Presentation of Metallurgical Information," by J. W. Jenkin, 6.30 p.m., in the Manchester Room of the Central Library, Manchester.

Institute of British Foundrymen

Birmingham branch: "Applied Foundry Research in France," by G. Blanc, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

London branch: "Modern British Bathmaking Practice" (and film), by G. R. Webster, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

FEBRUARY 25

North-East Metallurgical Society

"Copper and Copper-alloys in Modern Technology," by E. Voce, 7.30 p.m., at the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.

Southampton Metallurgical Society

"Strain Ageing of Steel," by T. R. S. Williams, M.SC., 7.15 p.m., in the Engineering Block, Southampton University.

FEBRUARY 26

Institute of British Foundrymen

Falkirk section: "Enamelling of Castings," by J. Bernstein, 7.30 p.m., at the Temperance Cafe, Lint Riggs.

FEBRUARY 27

Institute of British Foundrymen

Wales and Monmouth branch: "Non-destructive Tests in the Foundry," by J. A. F. Jarvis, 6 p.m., at the King's Head Hotel, Newport, Mon.

TO BRIDGE THE WIDENING gap between the education of the arts and the science student, a general studies course is being carried out at the Royal College of Science & Technology, Glasgow. The course is of four years' duration, and the one hour per week which the technical college students spend on the course is divided between lectures and films. Apart from the University College of North Staffs, at Keele, the Glasgow College is the only one in Britain where a major effort of this kind is being made.

Oxygen Enrichment in a Crucible Furnace

*By T. C. Churcher, B.Sc., A.R.I.C., and C. A. Walters, B.A.**

Oxygen has been widely used for intensifying combustion in the open-hearth furnace, both in the UK and abroad. Experiments have shown that the oxygen is best used for burning additional fuel. The replacement of part of the air supply by the equivalent volume of oxygen, *i.e.*, the effective removal of nitrogen, has not proved so useful. The amount of oxygen added is normally about 3 per cent., which enables an additional 15 per cent. of fuel to be burnt, with a consequent reduction in the melting time. In addition, a useful reduction in oil consumption can be expected. The crucible furnace at British Oxygen Research and Development, Limited (BORAD) is used for melting pig-iron for oxygen steelmaking experiments. During normal melting, oxygen enrichment was used for several months to obtain the results described in this article.

The crucible furnace in the foundry at the works of British Oxygen Research and Development, Limited, is used for melting 1 to 1½-cwt. batches of pig-iron. It is a type-CA250 central-axis furnace using a TP901 crucible, and is fired with oil of 35 to 40-sec. viscosity. The unit was bought for melting iron, and was therefore equipped with a larger fan than normal, the nominal capacity being 300 cub. ft./min. at 25 in. w.g. Ever since the installation of the crucible furnace, details of melts have been recorded by the furnacemen on data sheets, and this system was continued during the oxygen-enrichment experiments described in what follows. In this way it was hoped to avoid any prejudice of results, which might arise from more stringent control during the trials.

Experimental Method

Before charging the metal for the first melt of the day, the furnace was pre-heated at an indicated air-pressure of 15 in. w.g.—this was increased to 24 in. w.g. after the metal had been charged. Occasionally a gas torch was used for pre-heating the furnace to a dull red heat, when only a few minutes pre-heat with oil was required before charging. Prior to the second and subsequent melts of the day, the furnace was charged and then pre-heated using oil for five minutes before increasing the air and fuel to the maximum rate. The melting time was taken as being from the time of charging until the time of the last recorded temperature before the metal was tapped. The oil consumption was determined by using an oil-flow integrator, and the melt temperature measured with a platinum/platinum-13 per cent. rhodium thermocouple. When oxygen was to be used the furnace was fired as explained above to give a normal flame. The oxygen was then set at the pressure required, as explained below, and the oil rate increased to return the flame length to the initial value.

* The authors are on the staff of British Oxygen Research and Development, Limited.

Test Apparatus

The furnace was equipped with the simple apparatus shown in Fig. 1, in which an orifice and a pressure gauge serve as instrumentation. A welding nozzle can be fitted—thus a range of accurately-bored orifices is readily available. The operating conditions are determined from the formula:

$$Q = 750d^2 (p + 14.7)$$

where Q = flow rate (cub. ft. per hr), d = orifice diameter (in.) and p = gauge pressure (lb. per sq. in.) This formula is accurate to ± 5 per cent at pressures of 15 lb. per sq. in. and greater. Consequently the welding nozzle was chosen so that the pressure was greater than 15 lb. per sq. in. at the required flow rate.

Oxygen was first used throughout the life of crucible G7. An enrichment of 4.5 per cent. was obtained with an oxygen rate of 390 cub. ft. per hr. from a welding nozzle (type 55) of 0.1285-in. bore operated at 16 lb. per sq. in. At the beginning of this work the oxygen flow-rate was checked with an accurately calibrated pressure-gauge/rotameter assembly, and the fan rate was determined by sampling the blast when oxygen was being added at a known rate. Crucible G8 was operated at a lower oxygen-enrichment level, *i.e.*, 2 per cent. using a welding nozzle of 0.089-in. bore at an upstream pressure of 17 lb. per sq. in. It will be shown later on under "Comments on Results," that similar results were obtained at both oxygen levels. Consequently, crucible G9 was operated with oxygen on alternate days only for each weight of metal melted, to determine whether the results from crucibles G7 and G8 were influenced by some difference between the crucibles themselves. Of the weights charged, 70 per cent. were of 100 or 110 lb.; the rest were of 70, 130, 150 or 180 lb.

Results

The presentation of the results is rendered difficult by several factors which have been experienced previously in the assessment of flame enrichment in open-hearth furnaces. The experiments were carried

FIG. 1.—*Oxygen injection apparatus used in the trials at the British Oxygen Research foundry.*

out under "production conditions," in that the weight of metal charged and the tap temperature required were dictated by the experiments for which the metal was melted. For this reason, it has not been possible to obtain data for any non-ferrous melting, which is only infrequently done at the author's firm. The temperature of the furnace before charging melts, other than the first one of a day, depended on the duration of the experiment, it being undesirable to maintain firing during an experiment owing to the noise. Experience with open-hearth enrichment experiments has led to the opinion that the results meet with disbelief if those experiments which do not conform to a rigid set of conditions are discarded. It has, therefore, been the intention to assess all melts carried out in the crucibles considered, but, in spite of this, five melts have been omitted from the consideration where conditions were wholly unrepresentative, *e.g.*, shortage of oxygen, very small melts and pre-heated charge.

Heat Input

The heat input to the charge has been calculated from the data sheets, assuming an average specific heat of 0.2 for the solid and liquid ranges involved. In fact, an accurate evaluation should take account of variation of specific heat with temperature, and the latent heat of phase change and fusion, but as has been shown in a previous report[1], there is great diversity in the determined values of these quantities, and for the purpose of this comparative work the approximation was thought adequate. From these figures the rates of heat input were evaluated in B.t.u. per gall. and B.t.u. per min. The average melt weights, melt temperatures, melting times, fuel consumed, average rates of heat input $\left(\frac{Q}{G}, \frac{Q}{T}\right)$ and fuel consumption $\left(\frac{G}{T}\right)$ are recorded in Table 1. This table shows the average for all melts, but since the 100- and 110-lb. melts account for 70 per cent. of melts considered, and further, since these are subject to less variation in delay between tapping and recharging, they have also been assessed separately.

The assessment of crucible G5, which was used throughout its life without oxygen enrichment, was carried out first, to investigate the possible differences between melting times for the first, second and third melts of the days and the effect, if any, of crucible age on melting time. For this purpose the 100-lb. melts only were considered, and all melting times were corrected to a hypothetical final temperature of 1,450 deg. C., assuming a rate of temperature rise of 4.5 deg. per min., this being the average rate of temperature rise between 1,300 and 1,450 deg. C. for crucible G5. The corrected melting times were then plotted as a function of melt number for the first, second and third melts of the day respectively (see Fig. 2).

TABLE 1.—*Results of the Oxygen-enrichment Trials (Weight, Fuel, etc., Totals are Averages).*

Crucible.	Enrichment (per cent.).	Total melts.	Weight melted (lb.).	Melt temperature (deg. C.).	Melting time (min.).	Fuel (gall.).	Q/G (B.t.u. per gall. × 10⁻³.	Q/T (B.t.u. per hr. × 10⁻⁶).	G/T (gall. per hr.).
All Melts									
G4 and G5 ..	Nil	79	98.3	1,430	64.1	6.2	8.3	4.7	5.8
G7 and G8 ..	—	73	112	1,450	59.4	6.0	9.8	5.9	5.9
G9 A	Nil	19	126	1,452	79.5	7.4	9.1	5.0	5.5
B	2.0	24	124	1,445	71.5	6.6	9.9	5.4	5.6
100- *and* 110-*lb. Melts only*									
G4 and G5 ..	Nil	64	102	1,422	63.5	6.2	8.5	4.9	5.8
G7 and G8 ..	—	50	104	1,442	55.6	5.5	9.8	5.8	5.9
G9 A	Nil	8	103	1,463	68.5	6.3	8.5	4.7	5.5
B	2.0	11	103	1,454	63.8	5.9	9.2	5.0	5.5

Comments on Results

The graphs in Fig. 2 suggest that the first melts of days take longer than subsequent melts, and there is no apparent increase of melting time with the age of the crucibles. The latter factor is largely a property of the type of crucible used, the very refractory glaze of which helps to prevent sponging and oxidation of the graphite in the wall, and is noticeable whether oxygen enrichment is used or not. During the enrichment trials no increase in furnace-lining wear could be detected, apart from a small piece of brickwork which fell near the burner and deflected the flame during the life of crucible G9, as detailed below.

Crucible Life

Any assessment of crucible life is difficult, since, to avoid damage to the furnace, crucibles have not been tested to destruction. The crucible is usually discarded after about 40 melts have been carried out. The crucible change is usually planned to take place over a week-end, or on a day when no melting is required for experimental programmes. As will be seen from Fig. 3, crucibles used with oxygen enrichment show more "honeycombing" than usual, but this does not appear to have reduced the effective crucible life. The slagging of the outside of the crucible has necessitated discarding the crucible stand at each crucible change. When oxygen was not used, the crucible stand only required changing after every three or four crucibles had been used.

The operating conditions in the British Oxygen Research foundry may be more exacting than would be found in production establishments, for the following reasons:

(1) The furnace is used exclusively for the melting of iron, to temperatures between 1,300 and 1,500 deg. C.

(2) Rarely are more than three charges melted during the day; thus a third of the total melts are first melts of the day, with a consequent increased wear owing to the prolonged melting time.

(3) There is normally a delay between the tapping of one batch of metal and recharging, and the furnace is usually not fired during such an interval.

The number of melts assessed, and the total weight of metal melted, for the crucible concerned are recorded in Table 2.

TABLE 2.—*Number of Melts assessed, and Weight of Metal melted, in the Crucible Tests.*

	G4	G5	G7	G8	G9
Number of melts ..	41	40	36	39	44
Weight melted (lb.). .	3,820	4,150	4,110	4,330	5,465

Ideally, the results should be expressed in terms of the average time and fuel required to melt a constant weight of metal to a constant temperature. The data collected from these experiments cannot be readily corrected to these constant conditions without introducing a number of uncertainties, and it is for this reason that the average heat-inputs have been calculated. Although these quantities may be less tangible to the practical foundryman, they do enable a more strict comparison to be carried out between normal and enriched melting.

Statistical Comparisons

Student's "t" test was applied to sets of data both for 100- and 110-lb. melts only, and for all melts. No significant differences were found between the two crucibles G4 and G5 used for non-enriched melting, or between G7 and G8 used at different levels of oxygen enrichment. Therefore, for the purposes of assessment, it is permissible to sum together the data for G4 and G5, and also that for G7 and G8. Comparison then shows that the heat inputs per gall. and per min. were very significantly greater during oxygen enrichment. Similar comparisons for fuel consumption show a significant difference only when all melts are considered. The comparisons between the enriched and non-enriched melts carried out with crucible G9 indicate that insufficient melts were carried out under each condition to enable useful results to be obtained.

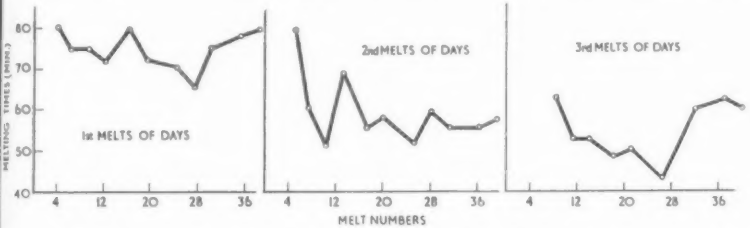
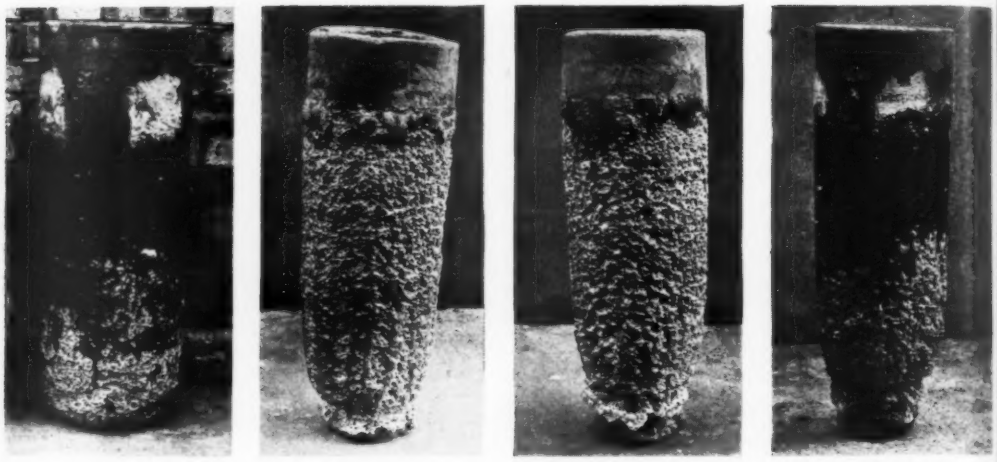


FIG. 2.—*Graphs of corrected melting times plotted as a function of melt number, showing variation of melting time with crucible age.*

Practical Results

Consideration under this heading will only be given to the combined results of the two crucibles in which oxygen was not used, and the two crucibles in which oxygen was used throughout their entire lives. The use of oxygen has effected a decrease in melting time from 64.1 to 59.4 min., and a decrease in fuel consumption from 6.2 to 6.0 gall. Furthermore, when oxygen was used the melt temperature was raised from 1,430 to 1,450 deg. C., despite the fact that the average weight melted was 112 lb., compared with 98.3 lb. when oxygen was not used. Consideration of the 100- and 110-lb. melts only shows that in both series these melts were carried out under more constant conditions. In this case the melt times decreased from 63.5 to 55.6 min., and the oil consumption



G5—40 MELTS (no enrichment). G7—36 MELTS (4.5 per cent. oxygen). G8—39 MELTS (2 per cent. oxygen). G9—44 MELTS (2 per cent. oxygen, alternate melts).

FIG. 3.—*Varying degrees of crucible wear which occurred during the experiments on enrichment.*

from 6.2 to 5.5 gall. When oxygen was used an average of 104 lb. of metal was heated to 1,442 deg. C., compared with 102 lb. heated to 1,422 deg. C. without the use of oxygen. Considering all melts, the heat input increased from 8,300 to 9,800 B.t.u. per gall. of fuel, and from 790 to 980 B.t.u. per min., during oxygen usage. The actual fuel rate increased from 0.096 to 0.099 gall. per min. when oxygen was used. Considering now only the 100- and 110-lb. melts, the use of oxygen increased the heat input from 8,500 to 9,800 B.t.u. per gall., and from 820 to 970 B.t.u. per min. The average fuel rate increased from 0.097 to 0.099 gall. per min.

The effect of oxygen enrichment on melting times is displayed graphically in two frequency-distribution histograms (see Fig. 4); these demonstrate quite clearly the increased melting speed obtained when oxygen is used. The average melt times obtained with crucible G9 were longer than those experienced with crucibles G4 or G5, G7 or G8. This was due in part to the higher average weight of metal melted, and also due in part to the piece of brickwork which fell in front of the burner.

Conclusion*

The assessments carried out suggest that oxygen enrichment may be applied with benefit to the oil-fired crucible-furnace, with no considerable increase in the wear of either the crucible or the furnace lining. No apparent difference was found between the use of 2- and 4½-per cent. enrichment, both of which permitted reduction of melting times and fuel consumptions by about 12 per cent.

The authors wish to record their thanks to the directors of British Oxygen Research and Development, Limited, for permission to publish this work.

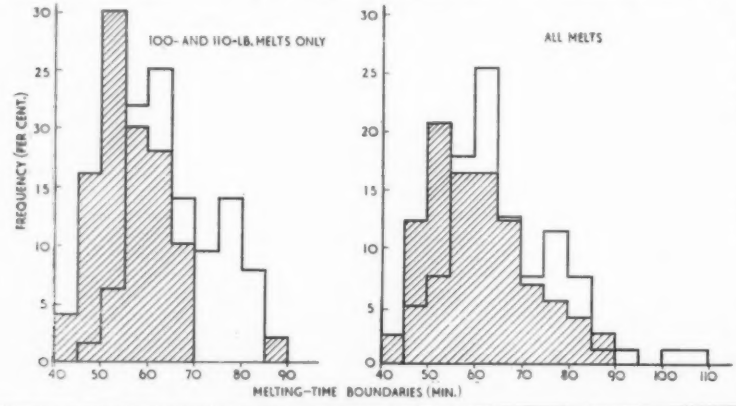


FIG. 4.—*Frequency-distribution histograms showing the effect of oxygen enrichment on melting times.*

REFERENCE

1 J. A. Charles, W. J. B. Chater and J. L. Harrison. "Oxygen in Iron and Steel Making." Butterworths Scientific Publications, London, 1956, pages 3 and 4.

* Continuation of the work reported in this article, to include application to the melting of non-ferrous metals and alloys would be of particular interest. The Authors state that when the opportunity for this arises, they will pay particular attention to metal yield, which was unchanged when using oxygen during iron melting.—EDITOR.

Equipment and Supplies

Petrol Engine for Industry

A new range ("Series 90") of small petrol-engines suitable for lawnmowers, pumps, cultivators, charging sets and similar equipment has been developed by the power-unit division of BSA Motor Cycles, Limited, Birmingham, 11. The engines are offered in competition with American units which have become available since licensing restrictions were relaxed at the beginning of 1959. The new unit is an "over-square," air-cooled four-stroke engine of 87 cc. capacity, weighing only 23½ lb., which develops nearly 2 b.h.p. It is interesting to record that, after considerable testing at the company's Small Heath development department, pressure-die-cast alloy designs were rejected in favour of iron-alloy castings for the main body. The great stability and rigidity of cast-iron under all climatic and operational conditions—and its freedom from the problems associated with linered bores and chromium plating on aluminium—were considered more important than the slight weight disadvantage. Nevertheless, the power/weight characteristics of the engine were kept in mind, and the effects of using the heavier material for the main body casing were minimized by the use of thin sections wherever possible. Elsewhere on the engine extensive use has been made of aluminium alloys for items such as cylinder-head, piston, connecting rod and crankcase end-cover.

Continuous Coreoven

Radiant-Heating, Limited, Barnsbury Park, London, N.1, have designed a simple and inexpensive gas-fired unit (see Fig. 1), the "Mastertherm" continuous coreoven, to suit the needs of the mechanized foundry. The company claims that with this unit: cores can be produced in a fraction of the time taken in a conventional oven; running costs are greatly reduced, and a minimum of floor space is required (the smaller model occupies only 14 sq. ft.). The coreoven is semi-portable, and hence can be easily positioned near to the moulding machines. The oven itself is constructed in heavy-gauge mild steel, braced with angle-iron and lined with proprietary heat-insulating material, and is mounted on an angle-iron frame and finished in stove enamel. The main heat-input is supplied by Mastertherm-Schwank gas-fired surface-combustion burners in the sides and/or in the roof of the oven, depending on its size. In addition, one or more burners of the same type are fitted beneath the conveyor in the pre-heating zone in order to ensure that the cores are correctly baked on the underside. For ignition, a permanent pilot-light is mounted alongside each burner.

Temperature Regulation

The operation of the burners is controlled electrically by means of a solenoid valve fitted on the main gas-supply. This same valve also controls the electric single-phase motor which drives the conveyor. A spring-loaded governor with a screw adjustment is fitted on each burner manifold, these governors providing a simple means of regulating the oven temperature without interfering with the individual gas-cocks. The fractional horse-power motor is mounted at the base of the supporting framework and supplies power for the special heat-resisting conveyor-belt, which is chain driven.

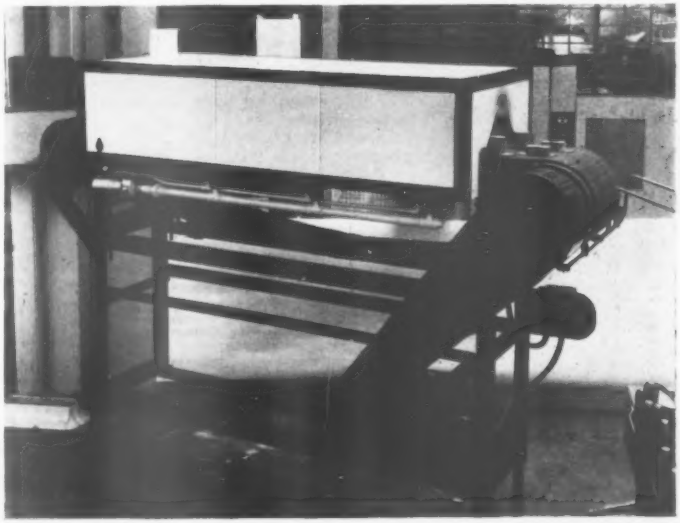


FIG. 1.—*Continuous coreoven made by Radiant-Heating Limited, of London, shown here being transported on a platform trolley.*

Plastics for Repairs

The germ of an idea which might be applied for mould-board or pattern repairing is contained in a Press release from Furane Plastics, Incorporated, 4516, Brazil Street, Los Angeles 39, California, USA. Here it is stated that epoxy-resin/glass-fibre coatings are being applied to wooden pallets used on conveyors. It seems that as a result of wear, splinters appear on the pallets which can damage the goods handled. For the repair of such defects, a special impregnating grade of epoxy resin is combined with an appropriate hardener and the combination brushed on to glass-fibre tape surfacing the wooden pallet strips. The materials set rapidly at room temperature, it is claimed, permitting the repaired pallets to be put into use with a minimum of lost time. Heat lamps or hot air can be used to effect repairs to pallets in a matter of minutes. It would seem that foundry mould-boards, pattern-boards, wooden patterns or coreboxes could be repaired by adopting similar techniques.

Bench Muffle Furnace: A new bench-model, all-purpose muffle-furnace has been designed by the Allied Engineering Division of Ferro Enamels, Limited, of Wombourn, Wolverhampton, to meet the demand for a neat, compact and reliable unit for temperatures up to 1,000 deg. C. The working chamber consists of a nichrome-wound muffle forming an independent unit readily interchangeable with the minimum of effort. The muffle size which has proved to be most practicable for test firing samples is 18 in. deep by 5¼ in. high by 7½ in. wide.

American Letter

Ladle-to-ladle degassing of Steel

The presence of hydrogen in steel has always been of great concern to the steel industry, the damaging effects of flaking and the necessary prolonged heat-treating cycles being costly to both producer and user. The first melt of steel to be vacuum degassed at Erie Forge & Steel Corporation, Pennsylvania, was produced on September 13, 1958. On March 21, 1959, another melt was ladle-to-ladle degassed, and 13½ tons of steel air-poured into ring castings. This is believed to have been the first heat in the USA to be stream degassed by the ladle-to-ladle process. The initial vacuum-degassed and air-poured melt was melted in a 75-ton basic electric furnace.

Furnace Set-up

Fig. 1 shows how the furnace ladle is positioned over the pony ladle, and a suitable vacuum maintained in the vacuum chamber. The furnace ladle stopper is then actuated, allowing hot metal to flow into the pony ladle. Molten metal is poured into the 150-ton pony ladle to the three-quarters full mark, then the stopper is opened, permitting the metal to break the aluminium rupture-disc directly below the pony-ladle nozzle. As the metal pours into vacuum, hydrogen and other gases are removed from the droplets that make up the pouring stream. The pouring time of five to eight minutes is controlled by the size of the pony-ladle nozzle. With the melt now in the vacuum chamber, nitrogen is admitted in order to offset the formation of an explosive gas-air mixture. The hot-metal stream appears to be less turbulent than usual, and pours smoothly. Samples for hydrogen analysis are obtained from the feeder-head during pouring.

Experimental Work

A research programme was initiated for two cast-steel rings, which were made from vaccum-degassed 0.36-per cent. carbon steel. These ring castings were cast to 74¾ in. o.d. by 63½ in. nominal i.d. by 23 in. face width, with 4 in. of the face width available for test purposes. Since the rings would replace forged rings if equivalent properties and soundness could be produced, the aim was to comply with the following minimum requirements: Tensile strength 35.68 tons per sq. in.; yield point 17.84 tons per sq. in.; elongation (in 2 in.) 22 per cent., and reduction of area 40 per cent. The mechanical properties were determined from standard tensile-bars machined from (*a*) test-coupons, and (*b*) the test metal which was cast integrally with the casting as an additional 4-in. face width.

Results: It was found that the properties of the test-bars in the annealed condition complied with the tensile, yield-point and elongation requirements, and were only one, and four, per cent. respectively below the reduction-of-area requirements for the two bars tested. Test-coupons wired to the ring castings during water quenching and tempering gave properties which exceeded the mechanical-property requirements. Tensile bars were machined from the cast ring test-metal, and also gave very good results. All the mechanical properties obtained proved to be better than had been expected.

Soundness: Ultrasonic tests performed on both castings after machining showed a 15 per cent. indication in one localized area of one casting. This area was marked and removed as a ½-in. thick section. It was then X-rayed, and a cluster of fine porosity disclosed. No other defects were evident in the remainder of this casting or in the second casting.

Applications for Vacuum-degassed Steel Castings

The benefits of hydrogen removal by vacuum degassing from steel for turbine and generator rotors and other large forgings have been well established. Steel castings that may also benefit from the removal of hydrogen are: valve bodies, pressure cylinders, propeller blades, press frames, anvils, rams, trunnions, strut frames, stern frames, gears, pinions and any large-section alloy-steel casting. Interest has recently developed in low-hydrogen steel castings that require subsequent plating or babbitting, since blistering has been attributed to the presence of hydrogen. It is not the intention of this paper to maintain that vacuum degassing is a cure all for foundry problems, but to suggest that some improvements at least can result from its use.

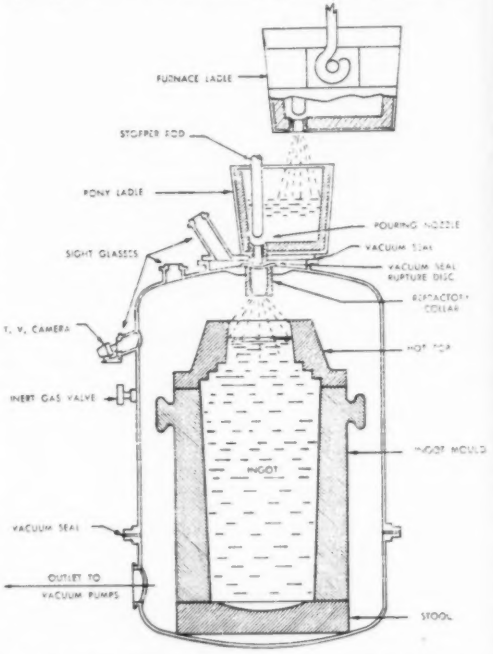


FIG. 1.—*Diagram showing the set-up of the vacuum stream-degassing unit at Erie Forge & Steel Corporation. A ladle is usually positioned to receive the hot metal, instead of the ingot mould shown.*

*Abstract from a paper, by E. Dyble and G. E. Danner, describing the vacuum-degassing of steel for castings at Erie Forge and Steel Corporation, Erie, Pennsylvania. The paper was presented in full at the December 2 to 4 meeting of the electric furnace committee of the American Institute of Mining and Metallurgical Engineers, in Cleveland.

AN EXHIBITION of "Wiggin Nickel Alloys in Industry," is being staged by Henry Wiggin & Company, Limited, at Park Lane House, 45 Park Lane, London, W.1, from March 21 to 25. During the exhibition a series of lectures will be given on the uses of high-nickel and nickel-base alloys, and these will be augmented by a continuous showing of films of applications and fabrication of the company's products. The exhibition will be open daily from 10 a.m. to 8 p.m., closing at 5 p.m. on Friday, March 25.

BSFA Members' Castings on Show

A number of interesting trends in steelfounding practice and casting design will be shown at the Engineering Materials and Design Exhibition at Earls Court next week. Stand number 48, one of the largest, will be used by members of the British Steel Founders' Association collectively to display out-of-the-ordinary castings, that is, those exemplifying the current emphasis on catering for customers' special needs. Details are also appended of the Congress which the steelfounders have organized to run concurrently with the Exhibition.

Outstanding in the Engineering Materials and Design Exhibition, opening at Earls Court on February 22, will be a collection of more than 50 outstanding castings which have been selected from firms throughout Britain by the British Steel Founders' Association, Sheffield. The British steelfoundry industry hope that this collection will show that there are now considerable facilities in this country for the economic production of components of all types for a wide variety of industrial purposes. The examples which will be on display, either the actual casting or photographs, range from golf-club heads to a hydraulic cylinder for a 105,000-ton tanker. They will help to show: (*a*) how steel castings have actually replaced components previously fabricated or forged; (*b*) how they have enabled a saving in direct cost or weight, and (*c*) how overall economies have resulted from the castings' longer life and reduced maintenance. It will be demonstrated how designers using steel castings have been able to introduce strength where wanted, or lightness where desirable. The various displays will also spotlight how the problems of thermal and mechanical shock, wear or distortion have been successfully countered.

Many steelfoundries have been developed in various areas in Britain to supply the specific needs of individual industries, but continued research has greatly extended material specifications and ways in which materials can be used. To-day, steel castings play a vital part in industry, and modern foundry techniques are such that, apart from cases where complexity rules that only the casting process can be employed, the most economic means of producing many components is by casting in steel. Even where there is no immediate cost advantage, the strength and rigidity of cast steel, and the freedom afforded in design to distribute weight and lightness where needed, mean that the overall cost of steel castings can be lower than that of competitive materials by virtue of longer life and lower maintenance costs.

The various individual exhibits, a number of which are shown in Fig. 1, will attempt to show the wide scope of modern foundry techniques, and the advantages that can be gained by consultation with steelfoundry engineers at the earliest possible stage. Direct cost saving will be most clearly shown by: diffuser vanes for atomic energy application; coal-cutter gearbox; winch gear-ring and gearbox top-cover for mechanical handling, and idler hub-centre for earth-moving equipment—where steel castings have replaced fabrications with direct cost savings of from 12 to 60 per cent. Similar direct cost advantages will be illustrated on the stand by: a bung bush for breweries; axle box for railway goods-wagons; splicer bar for hot drawing of gas cylinders; golf-club heads; fly-wheels for automobile diesel-engines, and bearing-saddle and eccentric straps for large marine diesel-engines.

Principles Illustrated

The bearing-saddle casting is intended as an example of a technique now becoming even more widely appreciated by designers that of cast/weld construction. Nowhere have more marked advances been made in recent years than in the extension of the range of steels which can be welded. This has widened the application of sound engineering principles in the design of components and assemblies, and is resulting in the increased use of steel castings—often in conjunction with fabricated or forged parts.

Savings resulting from reduced machining times are represented by a slip for oil-drilling equipment, a reactor guide pan and lantern for atomic energy use, an anvil for a large steam-hammer and a terminal header and nozzle segments. These latter two also illustrate the technique of producing small components by precision casting, a method which can give worthwhile economies where repetition work with alloy steels is involved. Longer component life, in many cases enhanced by reduced maintenance costs and greater working efficiency, are exemplified in the coal lifter for a steelworks, an excavator bucket for earth-moving, an automatic coupler and draftgear for mine cars and a brake beam for railway goods-wagons. The direct replacement of other materials, to overcome failures by greater strength or superior properties, is displayed in the drive-gear housing for trucks for the mechanical-handling industry, the mould-holding and closing device for plastics injection machines, and the piston for a marine-diesel engine.

Examples of steelfoundry designs which have replaced other materials by reason of their greater

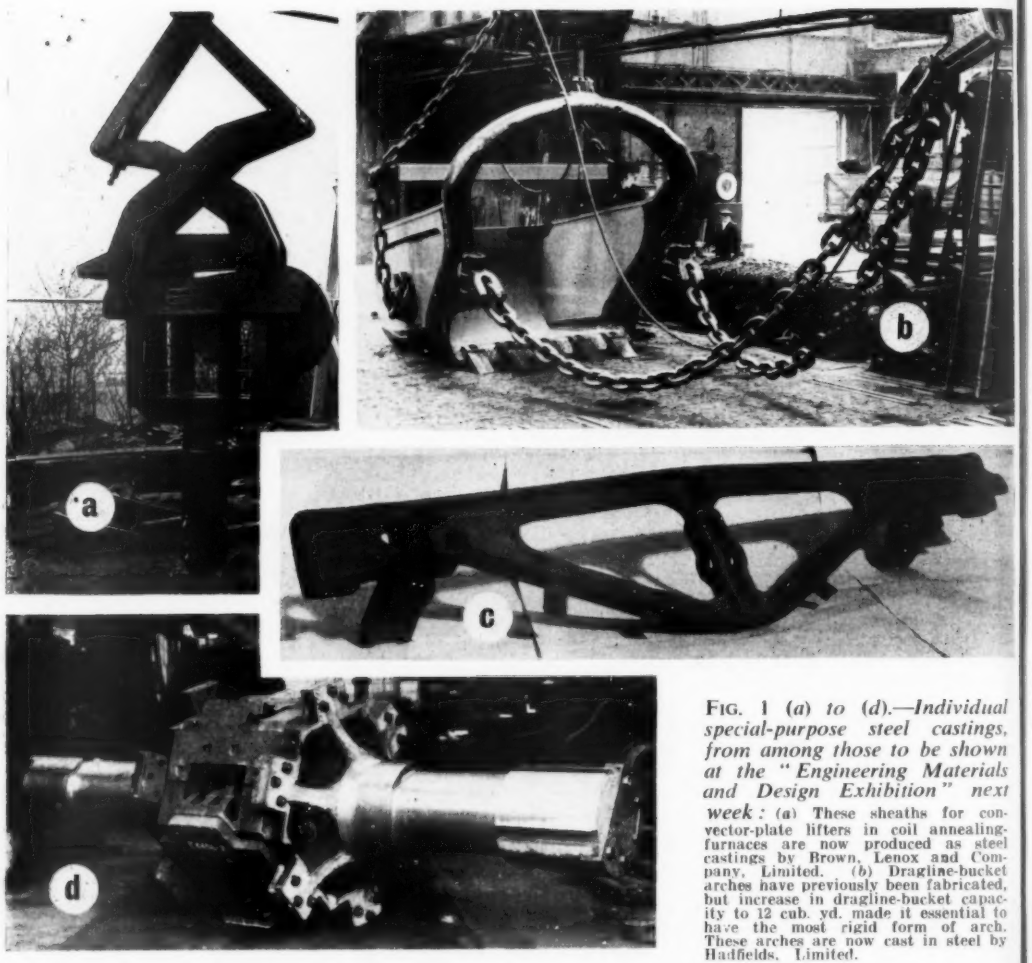


FIG. 1 (*a*) *to* (*d*).—*Individual special-purpose steel castings, from among those to be shown at the "Engineering Materials and Design Exhibition" next week:* (*a*) These sheaths for convector-plate lifters in coil annealing-furnaces are now produced as steel castings by Brown, Lenox and Company, Limited. (*b*) Dragline-bucket arches have previously been fabricated, but increase in dragline-bucket capacity to 12 cub. yd. made it essential to have the most rigid form of arch. These arches are now cast in steel by Hadfields, Limited.

(*c*) Brake beams for railway-wagon bogies are now widely made as steel castings in place of fabrications, many railway systems having standardized on this form of brake beam. Greater resistance to breaking under repeated shock loading gives longer life and reduced maintenance costs. The brake beam displayed is of the type made for British Railways by English Steel Castings Corporation, Limited.

(*d*) Six-sided top-dredger tumblers are now integral steel castings which have largely superseded the earlier forged shafts and cast bodies. The steel castings shown are 16 ft. 10 in. long and weigh 17 tons 12 cwt., giving greater strength for equal weight and eliminating the possibility of loose shafts. Extra strength is derived, too, from the provision of ribs. (Cast by Hadfields, Limited.)

resistance to a particular form of loading are shown in a spiegel box for metals production, a furnace-charging arm for steelworks' use, a worm-gear case for mines and steelworks and a dragline-bucket arch for earth-moving equipment. The value of full collaboration between client and foundry from the earliest design stage is emphasized by the intricate pump-casing for marine use, convector plate-lifter for steelworks' use, and heat-exchanger core for the chemical industry.

Examples of improved efficiency, resulting from the foundry being given a free hand in design and production, can be seen in the diaphragm for atomic-energy installations, the locomotive bogie for railway wagons and the return band for oil and chemical processing.

Apart from the main theme of the display, graphs and charts demonstrate the centralized research activities of the British Steel Castings Research Association, and a number of recent international contracts completed by British steelfoundries. Photographs of steel castings, including a 185-ton crosshead beam for a United States forging press, are also on show.

Conference Programme

A resumé of the programme of the one-day conference which the Association is holding on

February 24, during the Engineering Materials and Design Exhibition at Earls Court, London, was published in the January 21 issue of the JOURNAL. Arrangements for this have now been completed and the resultant programme is as follows:

After the opening of the conference by the BSFA chairman, Dr. C. J. Dadswell, at 10 a.m., the first technical session will commence at 10.15 a.m., under the chairmanship of Mr. T. H. Summerson (chairman and joint managing director, Summersons' Foundries, Limited), with Mr. Frank Rowe (managing director, K & L Steelfounders and Engineers, Limited) as the lecturer on the subject of "The Steelfounding Industry as an Engineering Supplier." At 12 noon Mr. J. Smith (Davy and United Engineering Company, Limited) is to speak on "The Advantages to the Engineer from the use of Steel Castings," the chairman of this session being Mr. C. H. Kain (managing director, Lake & Elliot, Limited). The meeting will then adjourn to Cromwell Hall for a buffet luncheon at 1.30 p.m., a visit to the Association's stand at the Exhibition being made on the way there. Recommencing at 2.30 p.m., the final session will be held under the chairmanship of Dr. R. Hunter (assistant managing director, Clyde Alloy Steel Company, Limited), when Mr. F. Buckley (English Electric Company, Limited), will be dealing with "Modern Inspection Techniques for the Acceptance of Steel Castings." The conference will close at approximately 3.30 p.m.

Further "Foundry" Exhibitions

Other displays which will be either by foundry firms themselves, or by firms directly connected with the foundry industry, are described briefly in what follows.

The Morgan Crucible Company, Limited display will include Morganite Carbon, a material which is claimed to have great potentialities for the design engineer, since, among other advantages, it is as light as aluminium, has high resistance to wear, is easily machined and has a low thermal expansion. The Morgan Crusilite silicon-carbide furnace-heating elements will also be on show. These non-metallic elements are made in a range

FIG. 1.—*(e) to (i) Selection from the smaller types of castings which are to be on show at the exhibition:*

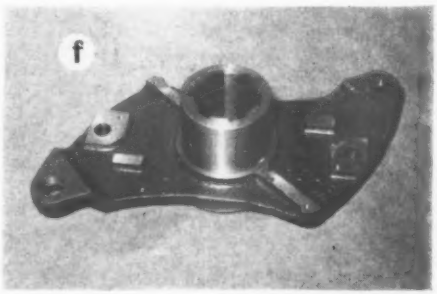
(e) Automatic coupling of mine cars is making obsolete use of chains and hooks, giving improved operation and greater safety. The couplers and draftgear shown are made by English Steel Castings Corporation, Limited, as steel castings, because steel castings lend themselves to the design of mechanisms which can be of great strength but assembled economically for unmachined parts.

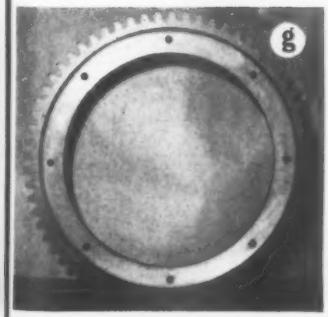
(f) To reduce the cost of manufacture on internal expanding-clutches for heavy-duty cranes, fabrications were replaced by steel castings for these backplates. Casting in steel by K. & L. Steelfounders & Engineers, Limited, gave a cost saving of 10 per cent. on each component.

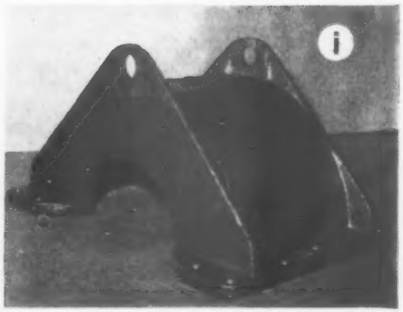
(g) High-strength and wear-resisting properties are essential for these gear rings to meet their arduous duties on crane winches. To give the required length of life and factor of safety at the lowest cost, the earlier fabrications were replaced by steel castings with a direct cost saving of 12 per cent. on each ring. (Cast by K. & L. Steelfounders & Engineers, Limited.)

(h) These compact and rigid axle-blocks for rail-crane use are now made as steel castings in BS 592. Whilst exhibiting all the properties required for satisfactory performance over a long life under conditions of repeated heavy loading, these steel castings show a direct cost saving of 18 per cent. on each block, when compared with earlier fabrications. (Cast by K. & L. Steelfounders & Engineers, Limited.)

(i) To reduce the cost of manufacture, whilst measuring up completely to the arduous conditions of service on Jones cranes, this worm-gearbox cover was remade as a steel casting by K. & L. Steelfounders & Engineers, Limited.







BSFA Members' Castings on Show

of sizes which aid in the construction of simpler, more compact and economical furnaces.

A.P.V.-Paramount, Limited, are to exhibit castings in their range of "Paralloy" stainless, heat-resisting, carbon and special alloy steels. Of particular importance will be a display of the range of Forging Quality cast stainless-steel pipe-fittings, produced to British and American standards, employed in the petroleum, chemical and nuclear-engineering industries. These cast fittings are directly interchangeable with their wrought counterparts for high-pressure service.

An interesting selection of cylinder liners and various types of roller, including induction-hardened units, will be displayed by Sheepbridge Stokes, Limited. Centricast printing rollers, which can be produced to suit any requirements up to 54 in. dia. and 13 ft. long, will be prominently featured. Bi-metal castings and long-length centrifugally-cast tubes will be exhibited, together with a wide range of industrial components in special steels and alloys. In addition, a method of producing continuously-cast iron or phosphor-bronze bar, in lengths up to 10 ft. in a comprehensive range of sizes starting from $\frac{1}{2}$ in. dia., will be demonstrated.

How plastics serve industry will be shown on the stand of the Distillers Plastics Group—British Geon, Limited; British Resin Products, Limited, and Distrene, Limited. A wide range of industrial products made from synthetic resins, plastics materials and nitrile rubbers will be displayed, 12 films showing continuously on six adjacent screens will demonstrate some of their more important fields of use.

Epoxy-resin Patterns from Sand Moulds

*By Thos. H. Elliot**

Several articles have appeared in the FOUNDRY TRADE JOURNAL *describing the manufacture of epoxy-resin patterns. It is noted that, in most cases, the patterns are produced from either plaster or resin moulds and little mention has been made of the use of sand moulds. The writer has supervised the production of a wide variety of first-class epoxy-resin patterns by the sand-mould method and it is thus proposed to describe a method which may be of use to others interested in resin patterns.*

Sand moulds intended to receive resin for patterns are prepared in the same way as an ordinary mould, the difference being that instead of a clay-bonded sand, a very fine silica-sand bonded with a proprietary brand of cold-setting resin is used. The chief advantage of this type of sand is that it flows freely and thus produces a perfect replica of the original wood pattern.

When a master pattern has been made for producing a resin production pattern, it will be found just as advisable to have it checked as before a pattern goes into production in the foundry. This ensures that a mould can be produced for a perfect reproduction at the mere cost of sand and cold-set resin. For such a sand mould the normal moulding boxes are used, thereby doing away with the need for making wooden frames which would be necessary if a plaster mould were adopted. First, the sand into which the cold-set resin has been poured is thoroughly mixed together in a sand mill, and then taken to the moulding box, tucked all around the pattern with the fingers (not rammed) after which the box is filled and the mould left to harden. (With this method, there is not quite the same urgency which is essential if plaster be used, and when two or more men are needed for mixing the plaster.) After the resin/sand has set, a light tap releases the pattern easily from the mould. The mould is thereupon returned to the patternshop, where all subsequent operations in preparing the epoxy-resin pattern are carried out in a fume-extracted mixing booth.

A sand-sealing solution (obtainable from manufacturers of epoxy resin) followed by Cellusol wax is first applied to the mould surface. The wax is put on with a rag, the mould being hard enough to withstand all the pressure necessary. The process of rubbing the wax on ensures a smoother surface than if it were applied with a brush. After this, two or three coats of release agent are used.

Subsequently, the pattern resin is mixed according to the manufacturer's instructions and cast in the usual way. When the pattern is set, the mould will break away from the casting fairly easily, leaving an epoxy pattern which only needs a light filing or smoothing with emery cloth.

This procedure gives a production pattern which is the equivalent of a metal one at just a little more cost than the resin itself, while the original wood pattern remains available—for any possible future modification, for example. This method of using a sand/resin mould has been found to be an easier, cleaner, and a cheaper way of producing a sound working pattern having many years of life. In the Author's experience, foundry personnel have never made a complaint against a resin pattern of this type or ever yet returned one for repair.

* The Author is foreman patternmaker, General Electric Company, Limited, Witton, Birmingham.

Industrial Development Office in New York

The President of the Board of Trade, Mr. Reginald Maudling, announced in the House of Commons last week that an industrial development office is to be established in New York (at the office of the British Consulate General, 99, Park Avenue, New York, 16) for the purpose of making information available in the United States about opportunities for setting up manufacturing enterprises in the United Kingdom. This will be in addition to the official sources already available. A senior official of the Board of Trade will take charge of the new office and is expected to arrive in New York on February 19. Mr. Maudling said the Government of Northern Ireland has also decided to expand its activities in this field and will be appointing staff to the office for this purpose. The office will work as an integrated unit on behalf of the United Kingdom as a whole under the general direction of H.M. Consul General in New York and of H.M. Minister Commercial in Washington.

Aluminium Alloys for Vitreous Enamelling*

By L. Lister

Most enamellers realize the importance of using a suitable grade of steel for enamelling, and take considerable trouble to obtain metal which gives the required enamel finish with the minimum difficulty. It is just as important to choose the correct grade of aluminium but, because of the very large number of alloys available, there is often considerable difficulty in deciding which will be the most suitable one for a given job. In this paper an attempt is made to simplify the task of choosing the most suitable alloy for various enamelling jobs, and to describe some well-tested methods of preparing metal for enamelling.

Commercially-pure Alloys

As a general rule, the purer the aluminium the easier it is to put on an adherent, durable enamel coating. Thus, the easiest common alloy to enamel is commercially-pure aluminium. This is designated as Noral 2S by the Northern Aluminium Company, Limited, the appropriate British Standard being BS 1470/SIC. The alloy consists of 99 per cent. aluminium with small amounts of various other metals as impurities. With this alloy very simple enamelling techniques will give strongly adherent coatings. Unfortunately, 2S suffers from two disadvantages: (1) it is a comparatively weak alloy, particularly after enamelling, for it is then in the annealed condition; more important, (2) it gives rise to heavy and widespread strain lines if it is fired more than once. This latter fault prevents any patching-in or re-coating so that, unless the enamelling is done correctly the first time, the metal must be completely stripped and refinished, or scrapped. In spite of this disadvantage, 2S gives good results for very simple work which requires only one firing.

The alloy known as Noral 3S (or NS3 in BS 1470) is commercially-pure aluminium with 1¼ per cent. manganese. It is as easy to enamel as 2S, and has the added advantage that it can be enamelled and fired twice, or even three times, without giving rise to strain lines. 3S is also a little stronger than 2S after enamelling. Unless considerable strength is required in the finished article, 3S is used as the standard general-purpose alloy for enamelling articles manufactured from sheet-metal. It is currently being used for enamelled holloware, wall tiles and unstressed architectural panels such as curtain wall panels. As the latter are always bonded to some form of building board in order to obtain the thermal insulation required, the strength of the enamelled panel is of little importance.

In the case of these two alloys the metal is fully annealed during the enamelling cycle, and it is found that the tensile strength of an enamelled panel is the same as that of a piece of annealed metal. In other words, the enamel adds nothing to the tensile strength of the metal.

Panel Stiffness

However, if the panel is flexed or bent, the enamel increases the stiffness of the panel, which is far more rigid than a similar annealed panel without enamel. The result depends, of course, on the relative thicknesses of the metal and enamel but, as an example, a panel 0.036 in. thick coated on both sides with 0.003 in. of enamel is three times as rigid as a sheet of annealed metal 0.036 in. thick. Since sheet material is more likely to be subject to bending than to direct tensile stress, this gain in stiffness can be very valuable. Because the original temper of the metal (hard, half-hard, or annealed) is not of any great importance (since the metal will become annealed during enamelling), the original temper of the material should be chosen to suit the manufacturing operations, such as spinning or pressing. However, annealed material is more susceptible to mechanical damage during handling than is harder material, and this alone justifies the use of metal in a hard temper where possible.

Preparation for Enamelling

The preparation of 2S and 3S metal for enamelling is really a matter of getting the surface perfectly clean and grease-free. The smallest trace of dirt or grease on the metal will cause spalling of the enamel at a later date. Insufficient or incorrect cleaning of the metal is probably the most common cause of enamel failure in service. A very reliable pretreatment for these two metals consists of the following:

(1) Removal, by vapour degreasing, of any heavy grease or oil remaining from spinning or pressing.

(2) Thorough cleaning of metal by immersion in a 10 per cent. solution of caustic soda, at a temperature of 60 deg. C. (140 deg. F.) for one to four min.

(3) Rinsing quickly in water.

(4) Immersion for a few sec. in a nitric-acid solution, to remove any adherent hydroxides formed in the caustic bath; the strength of this nitric-acid bath and the time of immersion are not in any way

* Originally published by the Institute of Vitreous Enamellers—reproduced by permission.

critical. An existing bath of 50 per cent. acid is used at Aluminium Laboratories, Limited, but experiments show that 10 per cent. works just as well.

(5) Thorough washing in clean water.

When the metal is dry, it is ready for enamelling. If the water is very hard or contaminated, the final rinse should be in clean de-ionized or distilled water, to prevent the appearance of drying marks on the metal. Panels with drying marks should not be enamelled, because these marks cause small local areas of spalling or poor adhesion.

Stronger Alloys

When a stronger alloy is necessary, the choice of metal is much more difficult. An examination of an aluminium-manufacturer's list shows that there are a number of strong aluminium-alloys available, many of which can be heat-treated in order to increase their strength. Unfortunately, however, enamels do not adhere easily to alloys containing magnesium or copper, which are two of the metals commonly added to aluminium to strengthen it. With some of these alloys the enamel flies off the metal quite violently as soon as it starts cooling.

Pretreatment

A number of pretreatment systems have been proposed in order to overcome this fault in strong alloys, but even with the best of these systems and the most responsive of the strong alloys the quality of the final product is still suspect. At present, manufacturers try to avoid enamelling strong alloys whenever possible. If a strong alloy must be used, the best choice is Noral B51S (or HS10 in BS 1470). This alloy can be heat-treated after enamelling in order to obtain increased strength. The preparation of this alloy for enamelling is rather more complicated than the preparation of 3S, and the adhesion of the enamel is not quite as good. With correct preparation, however, it is possible to obtain enamel coatings which pass the Porcelain Enamel Institute accelerated spall test[1]; with more severe conditions the enamel will spall more quickly and extensively from the 51S than from 3S.

The preparation for enamelling 51S consists of the hot caustic-degreasing and nitric-acid treatment, as described for 2S and 3S, followed by a chromate treatment and final firing. The bath used is the alkaline-chromate bath recommended by the PEI of America[2], and the metal is immersed in it for one to four min. at 50 deg. C. The metal is then washed well and fired in the furnace at 550 deg. C. for about 6 min. After this treatment the metal should be a uniform gold or pale green. Silver areas show that chromating has not taken place, while dark powdery deposits indicate too long a treatment in the bath. Both conditions will impair adhesion and may give rise to spalling at a later date. If, however, the treatment is satisfactory, the metal may be sprayed with enamel and fired in the normal way.

Applications

Sheet and Extrusions

2S, 3S and B51S are made in sheet form and extrusions, and generally reach the enameller as manufactured parts. For example, 3S sheet will probably be in the form of spinnings, pressings or formed panels. Although there will be problems with each of these, they are the simplest forms of metal to enamel. Extrusions, particularly architectural ones, come in a great variety of shapes, but most of them seem to have two things in common—sharp corners and deep recesses—both of which may make enamelling difficult. Moreover, they are often made from strong alloys, which are not easy to enamel satisfactorily.

Die-castings

Die-castings in a large number of special alloys are made by two methods: (1) pressure casting and (2) gravity casting. The most suitable of these alloys for enamelling are the aluminium-silicon alloys 160 and 123 (LM6, LM18 in BS 1470), both of which require the chromate pretreatment for best results. The method of manufacture is very important for castings; pressure-die-castings, for example, are usually of little use for enamelling, as the metal contains gas inclusions which, during the firing cycle, expand and cause blisters on the surface of the metal. Gravity castings do not suffer from this defect but they often have pin-holes and roughened surfaces, which may cause blistering of the enamel. Gravity-die-castings are usually better in this respect than sand castings. If the casting is of very good quality and made of a suitable alloy it can usually be finished satisfactorily, but the final result is unlikely to be of the same high standard as that reached with sheet metal.

Conclusion

A knowledge of the limitations set out above is essential when designing any aluminium article which is to be vitreous enamelled, and the best designs are most likely to be achieved by close liaison and co-operation between the designer and the enameller.

REFERENCES

[1] "Recommended Test Methods for Evaluation and Control of Quality of Porcelain Enamel on Aluminium," PEI *Bulletin*, June, 1956.

[2] "Recommended Processing Methods for Porcelain Enamel on Aluminium Alloys," PEI *Bulletin*, June, 1956.

Rising Production in West Germany

With the exception of pig-iron, there was a general increase in production in West Germany in the third week in January. Output of hard coal rose to 2,937,000, raw steel to 462,600 tons, rolled steel products to 215,900 tons, and semi-products to 160,900 tons. Pig-iron production dropped by 2,000 tons to 365,500 tons.

Over the past year the West German steel-processing industry had a combined turnover of DM 2,400,000,000 (over £200,000,000). This compares with DM 2,100,000,000 in 1958. Although turnover has been steadily rising since 1956, there are still some branches of the industry which are showing disappointing results.

Mr. T. H. B. WHITING has been appointed a director of Aveling-Barford, Limited.

Continuous Casting of Sluice-gate Stems

To withstand many years of immersion in corrosive waters in a Chicago drainage project, Ni-Vee bronze alloys, precision-cast by the continuous process developed by American Smelting and Refining Company, were used for the sluice-gate operating stems. The nine 20-ft. by 4½-in. dia. stems employed each weighed 10½ cwt. They now operate the sluice gates of the recently-completed Lockport, Illinois, flood-control project. This was the first time that continuous casting of the alloy at such length and diameter had been attempted. Using the continuous-casting process, such fine tolerances were reached that the need to machine the stems before threading them was eliminated. The bronze alloy had the following composition: Copper 88, tin 5, nickel 5, zinc 2, and lead (max.) 0.1 per cent. After heat-treatment, the stems had a yield-strength of 30 tons per sq. in., a tensile strength ranging from 33 to 40 tons per sq. in., elongation of 6 to 9 per cent., and an average BHN. of 250.

Manufacture of the bronze rods required precise casting methods and meticulous control during the annealing, straightening and heat-treatment processes. Heat-treatment was carried out at Benedict-Miller Company, New Jersey (one of the few companies with furnaces large enough to accommodate the stems), each rod being heated to 760 deg. C. for eight hours and then quenched in oil. This treatment softened the stems prior to straightening, after which they were further heat-treated by holding at 315 deg. C. for about 16 hours, followed by slow air-cooling—a process which imparted the desired strength characteristics by precipitation. The hardening treatment was followed by final straightening on a Watson-Stillman hydraulic press.

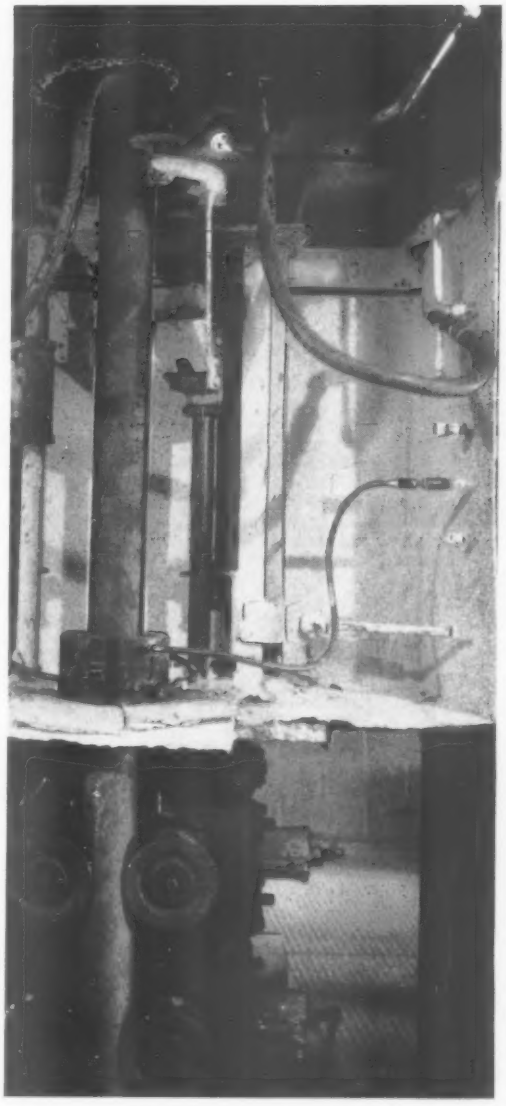


FIG. 1.—*Photograph taken from the floor below the pouring station, showing one of the continuous-cast 4½-in. dia. rods as it emerges from the die which is located in the bottom of the crucible. Hose connections lead to the water-jackets; the upper jacket surrounds the graphite die and solidifies the casting, while the lower jacket further cools the cast rod before it is gripped by the roll drive. The rolls control the speed of the casting operation, the rod moving slowly down to a lower floor on which is situated the cut-off saw.*

Crompton Parkinson Activities during 1959

Reviewing its activities during 1959, Crompton Parkinson, Limited, records some of the major contracts carried out by the company, including the extensive electrification work for the Ford Motor Company's paint, trim and assembly plant at Dagenham, the contract covering cables and switchgear, transformers, and high-frequency motor-alternator sets. A very large section of the company's business has, of course, been concerned with the electricity supply industry, and a number of contracts have been in hand for conventional power stations.

Work for the National Coal Board has been considerable and included 3.3-kV underground stand-by power cabling between two North Wales collieries. A large number of motors were supplied for a coal-handling and washing plant at a South Wales colliery and a number of contracts for cable and installation work and for the supply of switchboards in many other parts of the country.

E

Company News

C.V.A. JIGS, MOULDS & TOOLS, LIMITED—A dividend of 1½ per cent. for approximately nine months ended September 27, 1959, compares with 2 per cent. for the previous year. Profit for the period was £65,297, against £84,320 for the year.

E. H. BENTALL & COMPANY, LIMITED, agricultural engineers and ironfounders, etc., of Maldon (Essex)—The offer to shareholders of 584,920 ordinary 5s. shares at 5s. per share has been accepted to the extent of 97 per cent. There were 229 applications received for additional shares totalling 278,410. The basis of allotment was:—50 and under, in full; 51-1,000, 50; above 1,000, approximately 4 per cent.

DOWTY GROUP, LIMITED—The interim dividend is increased by one point to 6 per cent. in view of a "satisfactory" order-book and the prospect of continued improvement in trading. The company also intends to make a two-for-three scrip issue to shareholders. Estimated profits for the half-year ended September 30, after charging tax, are about £700,000. For 1958-59 a second interim dividend, in lieu of a final, of 6½ per cent., tax free, was paid.

BIRMINGHAM RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—The directors deny recent take-over bid rumours, but add that for some time they have been trying to find suitable means of diversifying the company's activities or improving its prospects in other ways. One or two projects have been surveyed and one is still under consideration. Discussions, however, are still preliminary. If anything more definite appears likely, all concerned will be informed promptly.

QUALCAST, LIMITED, light repetition ironfounders, etc., of Derby—In an interim report to shareholders Mr. J. E. V. Jobson, chairman, states that orderbooks are in a "very healthy" state, while production is increasing steadily. He cannot foresee any "serious snags" for the period immediately ahead. In the first six months of the current financial year both production and profits are in excess of the like period of 1958-59, while the company is within 1 per cent. of its budget to date for the year ending June 30 next. The budget, of course, the chairman adds, is an increase over last year.

CRABTREE ELECTRICAL INDUSTRIES, LIMITED—Announcing the maintenance of the interim dividend at 7½ per cent., the directors propose a one-for-one scrip issue and forecast a final of not less than 7½ per cent. on the increased capital for the year ending on July 31, 1960. This would be equivalent to 22½ per cent. on the present capital, as compared with 20 per cent. paid for 1958-59. As a result of revaluation, group fixed assets now exceed £1,200,000, compared with the balance-sheet figure of £571,000. It is proposed to increase the capital to £1,550,000 by creating a further 1,200,000 ordinary 10s. shares.

HILGER & WATTS, LIMITED, scientific-instrument makers, of London, N.W.1—The equivalent dividend of 15 per cent. is being maintained with a 10 per cent. final for the year ended September 30, 1959. The previous final included a 2 per cent. special interim. A one-for-five scrip issue is proposed as well as a one-for-four rights issue at 21s. per 5s. ordinary share. The directors anticipate that they will be able to recommend dividends for the current year aggregating 15 per cent. on the enlarged capital. The 1958-59 net profit of £126,575 compares with £112,574 after tax of £109,385 (£113,376) and depreciation of £57,744 (£51,801).

Power-Gas/Davy-United Merger?

Possible merger of the Power-Gas Corporation, Limited, gas, chemical, petroleum, blast-furnace, and steelworks engineers, of Stockton-on-Tees, and Davy-United, Limited, manufacturers of plant for steelworks and heavy engineering, etc., of Sheffield, is still being discussed, it was announced on February 4. No conclusion has yet been reached and a further announcement will be made as soon as details are available.

Meanwhile, group trading profits for Power-Gas for the year to September 30, 1959, rose to £1,857,713 (£1,380,186) and the dividend is increased from 20 to 30 per cent. A final of 22½ per cent. makes 30 per cent. on the £1,400,000 capital, against the 20 per cent. dividend for 1957-58, which included a 5 per cent. special interim.

Orders booked totalled £7,750,000, compared with £9,250,000, but since the year-end orders have returned to a satisfactory level. After all charges the group net profit attributable to the company has increased from £532,107 to £780,810.

MI's acquisition of Lancashire Dynamo

It has been announced that the Lancashire Dynamo directors have reconsidered their position and recommended those stockholders who had not already done so to accept the MI offer. Col. Marston stated that he and his co-directors had decided to accept the offer for their personal holdings.

Metal Industries announced last Thursday that acceptances had been received in respect of over 90 per cent. of that part of the ordinary stock in Lancashire Dynamo Holdings to which its offer applied, and also for over 90 per cent. of the preference stock. After February 19 (the closing date of the offer) the opportunity of the Lancashire Dynamo ordinary shareholders electing to take alternative "B"—one half of one ordinary share in MI and 45s. in cash—will lapse and ordinary stock units will thereafter be acquired only on the basis of one new MI ordinary and 12s. in cash.

Joint Embassy for European Communities

Diplomatic mission in London of the High Authority of the European Coal and Steel Community is to be discontinued, it was announced on February 8. Instead it is proposed that there should be a joint embassy representing the three Communities—ECSC, European Economic Community (Common Market) and the European Atomic Energy Community (Euratom).

It is understood that the present High Authority representative in London, Mr. E. N. van Kleffens, is likely to remain in office and that he, or his successor, will represent the Communities and not merely the executive bodies. He would therefore represent the six Governments in the matter of Community interests, besides the administration of integrated Europe.

A similar change is proposed in Washington.

Mr. W. E. BALLARD, managing director of Metallisation, Limited, of Dudley, flew to Ghana last week for the purpose of advising a constructional engineering company about the rusting of steel in tropical atmospheres.

Personal

Mr. J. BAXTER has been appointed sales manager for the Scottish branch of Griffin & George, Limited.

Mr. F. HEAP and Mr. W. S. LEWIS have retired from the board of Frederick Braby & Company, Limited, on reaching the retirement age of 70.

Mr. G. B. SCARLETT, sales manager, W. H. Paul, Limited, manufacturers of kitchen equipment and paraffin heaters, Breaston, Derbyshire, has been appointed sales director.

Keith Blackman, Limited, announce that Mr. H. W. WRIGHT has been appointed head of the electrical department at the Tottenham works. He succeeds the late Mr. J. KENYON, M.SC., who died on January 28.

Mr. A. W. WAGSTAFF has been appointed secretary of Whessoe, Limited, in the place of Mr. T. HESLOP who is retiring later this year after holding the post since 1938. Mr. Heslop will remain a director of the company.

Mr. SAMUEL CLEMENT LESLIE, former head of the information division of the Treasury, has been appointed consultant on public relations by the Iron and Steel Board. His Press officer is to be Mr. J. F. Aylard, a member of the Board's staff.

Colonel W. S. TYZACK has been elected president of the Sheffield Lighter Trades Employers' Association in succession to Mr. D. J. HAGGIE. Mr. A. H. PLEWS has been appointed vice-president in place of Colonel Tyzack, and Mr. G. MARPLES has been re-elected honorary treasurer.

Mr. R. T. REDFERN, vice-chairman and managing director of the Bryan Donkin Company, Limited, is to retire at the end of March, after an association with the company of 23 years. He will be succeeded by Mr. S. FARRER, a managing director of one of the larger units of the Tube Investments group.

Dr. J. N. ALDINGTON, B.SC., PH.D., an executive director of Associated Electrical Industries, Limited, has been appointed a director of Henley Foundries, Limited, and elected chairman of the board; Mr. R. S. LANE has been appointed commercial manager, and Mr. C. M. GRANT has been appointed sales manager.

Mr. A. CHRISTIE who for the past 26 years has been machine-shop foreman of Douglas Fraser & Sons, Limited (now Giddings & Lewis-Fraser, Limited), engineers, Arbroath, has retired after 50 years' service with the firm. He has received a presentation from Mr. W. Somerville, works manager, on behalf of the staff.

Mr. J. L. S. STEEL is retiring from the board of Imperial Chemical Industries, Limited, on March 24, his 60th birthday. He has been with ICI for more than 37 years and a director since 1945. In recent years he has been responsible for the company's economic planning, with particular interest in the Common Market and Free Trade Area.

The Owen Organization announce that subsequent to the decision of C. & L. Hill, Limited, Willenhall, Staffs, to re-organize their executive management, Mr. E. J. BOAG, previously works manager Phosphor Bronze Company, Limited, has been appointed director and general manager of the company and its subsidiaries. Mr. W. A. BANNISTER has been made sales director, and Mr. L. E. MORRIS continues as works director.

Sir CHARLES WESTLAKE, chairman, and Mr. JOHN BLACK, deputy chairman, of Metal Industries, Limited, have been appointed chairman and deputy chairman respectively of Lancashire Dynamo Holdings, Limited. Lt. Col. G. S. MARSTON has resigned as chairman and managing director of the latter company, but the EARL OF HALSBURY retains his office as vice-chairman. These changes follow the acquisition of Lancashire Dynamo Holdings by Metal Industries.

Mr. WILLIAM P. WALKER, managing director of William Denny & Bros., Limited, shipbuilders, Dumbarton, has resigned to become managing director of Brown Brothers & Company, Limited, hydraulic engineers, Edinburgh. He has been a member of the board of the latter company for some years, and has been closely associated with them in the development and improvement of the Denny-Brown stabilizer. On taking up his duties in Edinburgh he will remain a non-executive director of the Dumbarton firm.

Recipients of honorary degrees to be conferred by Sheffield University when the Home Secretary, Mr. R. A. Butler, is installed as Chancellor of the University on May 4, include:—Sir ROGER MAKINS, chairman of the United Kingdom Atomic Energy Authority, who will receive a Doctorate of Laws; Sir JOHN COCKCROFT, recently appointed Master of the new Churchill College, Cambridge, and previously director of the Atomic Energy Research Establishment at Harwell, Doctorate of Engineering; and Sir WILLIAM HODGE, Master of Pembroke College, Cambridge, who has been president of the Mathematical Association, vice-president of the International Mathematical Union, and president of the International Congress of Mathematicians, Doctorate of Science.

Mr. R. N. MILLAR, M.A.(CANTAB), a director of the General Electric Company, Limited, has been appointed managing director of the company's engineering group which has its main works at Erith, Kent, and Witton, Birmingham. Towards the end of 1954 after extensive experience in South Africa and Australia, Mr. Millar was recalled to England to take charge of the company's atomic energy developments and later that year became manager of the G.E.C.-Simon-Carves Atomic Energy Group. He was appointed general manager of Fraser & Chalmers Engineering Works, Erith, in 1958 and a year later became a director of the GEC. He has recently returned from Japan where he signed a £20,000,000 contract for the design and construction of a nuclear power-station at Tokai-Mura, a village on the seashore some 70 miles from Tokyo.

Publication Received

World of Meaning—a Panorama of the Great Organization of Smith's. Published by S. Smith and Sons (England), Limited, Cricklewood, London, N.W.2.

Obviously in a firm employing 20,000 people in 20 factories to produce a wide variety of merchandise, a great diversity of jobs is entailed. This 100-page brochure tells in well-written letterpress, and an abundance of excellent pictures, something of the methods and aspirations of the Smith organization. The standard of the publication is so high that any boy perusing it would have his interest so aroused that the idea of joining such a concern would be quite attractive. Indeed, the reviewer, himself, was particularly fascinated by the arrangements made for the training of apprentices, and for their social activities. The firm also produces precision-investment castings, but no reference to this activity is made in the long lists of productions quoted in the book. The recipients of this brochure can indeed count themselves fortunate for its contents are very interesting. (A note about the firm's production of precision-investment castings appeared in the JOURNAL of February 4, page 141.)

College for Teachers of Technology

A staff college for senior technical teachers and senior industrial staff should be established in Britain by the end of next year. At a Press conference on February 11, Sir Alexander Fleck, chairman of Imperial Chemical Industries, Limited, appealed to industry for the £40,000 still needed for its establishment. He said he had written to 250 industrial and commercial firms asking for contributions—£100,000 was required—and that £60,000 had already been promised by 30 firms.

Object of the college is to provide a centre where the senior staff from all types of colleges giving technical and commercial education, and senior members of industrial and commercial firms can exchange ideas and experience. In this way, the college will benefit industry and commerce by providing a closer link between them and technical education, and by providing better technical education.

Short courses of two to four weeks throughout the year are planned for groups of not more than 30, two thirds of whom will be technical teachers.

Its establishment was recommended by the Jackson Committee on the supply and training of teachers for technical colleges. The Committee felt there was a need at the highest level of the technical teaching profession for men with the breadth of outlook, attitude of mind, and authority needed to exert a strong influence both inside their own colleges and on the industrial and commercial firms they serve. The appeal for funds is supported by the Minister of Education, Sir David Eccles, who has nominated Sir Alexander as chairman of the governing body, which will represent industry and commerce, local education authorities, and teachers.

Running costs of the college of £30,000 a year will be paid mainly from public funds. A site has not yet been decided.

Graduated Contributions Regulations

Draft regulations* recently published supplement the rules laid down in the National Insurance Act, 1959, for assessing the new graduated pensions contributions, which it is planned to introduce in April, 1961. The National Insurance Act, 1959, provides for a graduated pensions contribution of 4½ per cent. each by employer and employee on that part of an employed person's remuneration which lies between £9 and £15 a week, unless he is contracted out as a member of an occupational pensions scheme satisfying certain conditions. The draft regulations lay down the precise graduated contribution payable at various levels of weekly earnings and provides for the treatment of remuneration not paid weekly.

The regulations include weekly and monthly contribution tables showing the graduated contributions payable at various earnings levels. The weekly table runs from £9 0s. 1d. to £15 in 5s. bands, and the monthly table covers the corresponding range of monthly earnings between £39 and £65 in £1 bands. Where an employer's pay-machinery cannot apply the banded contribution tables, the alternative of calculating the exact percentage rate to the nearest penny will be allowed.

The figure of remuneration on which contributions are calculated is made to coincide exactly with the gross pay figure used for PAYE tax purposes, thus facilitating collection of these graduated contributions through the Inland Revenue's PAYE system. For the graduated contributions, however, each week's (or month's, etc.) pay will be taken in isolation with no provision for cumulation over the year.

New Steel Production Record

New record for steel production was reached in January when the average weekly rate of 471,400 tons compared with the previous highest rate of 458,600 tons achieved in November, 1959, and with 356,900 tons in January, 1959. Production last month was, therefore, about one-third higher than a year ago.

In its production statement issued on February 11 the Iron and Steel Board points out that after allowing for the normal annual holidays and the holidays affecting the January figures, it is estimated that production in January was at an annual rate of 23,600,000 tons, or about 17 per cent. above output in 1959.

For 1960 as a whole production is expected to be about 24,000,000 tons or 20 per cent. higher than in 1959.

Pig-iron production in January also reached a record figure of 297,500 tons, compared with the previous best figure of 285,500 tons in October, 1957, and with 228,700 tons in January a year ago.

Latest pig-iron and steel output figures (in tons), with the corresponding 1958 and 1959 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1959—November ..	277,300	14,422,000	458,600	23,847,000
December ..	280,400	14,583,000	432,900	22,513,000
1960—January ..	297,500	15,470,000	471,400	24,511,000
1958—November ..	233,700	12,155,000	351,900	18,299,000
December ..	223,100	11,602,000	313,100	16,282,000
1959—January ..	228,700	11,894,000	356,900	18,560,000

SHEPCOTE LANE ROLLING MILLS, LIMITED—Mr. J. R. Edwards, works superintendent and a special director, has been appointed a director of the company. Mr. F. Brown, chief engineer, has been appointed a special director.

(Continued from column one)

Rules are laid down for assessing the contribution due on earnings not paid at regular weekly or monthly intervals, and on holiday pay received in advance.

Where a person is concurrently paid more than £9 a week in each of two or more separate employments the effect of the Act is that graduated contributions will be paid in each employment independently. This may lead to payment considerably beyond the maximum payable for a single employment. Under the regulations, an employee will be able to get a refund if his own share of the contributions in a tax year exceeds an amount fixed in relation to the most that would be paid by an employed person in a single employment.

The National Insurance Advisory Committee announce that they will consider representations on the draft regulations received by them not later than March 8, 1960. Representations should be made in writing and should be sent to the secretary, National Insurance Advisory Committee, 10, John Adam Street, London, W.C.2.

*The draft National Insurance (Assessment of Graduated Contributions) Regulations, 1960; price 9d. from H.M. Stationery Office, or through any bookseller.

NFC "Sandwich" Course

Training the Potential Executive

In a report on training potential foundry executives, printed in the Council of Ironfoundry Associations' *Bulletin* for February, Mr. J. Bamford, head of the National Foundry College states that:—Most foundrymen realize that present facilities for the education and training of the young men entering the foundry industry are not meeting the ever-increasing need for soundly trained men. Practical training for the craftsman is in the hands of the industry and technical training is catered for by the technical college courses based upon the City and Guilds syllabuses. Many young men training as foundry technicians and technologists also obtain their technical education through City and Guilds courses although these are designed for craftsmen. Others, realizing the limitations of the City and Guilds courses, attend national certificate courses in metallurgy or engineering courses which are not intended for foundrymen but for metallurgists and engineers.

Mr. Bamford then refers to the National Foundry College diploma course, which has been in operation since 1948. The young men from the industry who enrol for this course, have qualified through the City and Guilds and national certificate courses and the College trains them for higher posts. This course, says Mr. Bamford, has proved its value and the College has been specifically requested to continue it even when new courses are in operation. However, he points out, the value of a particular student depends, in a large measure, on his previous experience and education.

Higher Standard Required

Then, says Mr. Bamford, if the industry is to get the technologists it so urgently needs a course of much higher standard than the City and Guilds is required and it must be a course specifically designed for the training of foundry technologists. To meet this need the National Foundry College has designed a three-year sandwich course which will open in Wolverhampton in September, and successful students will be awarded the advanced diploma of the National Foundry College. The course has already obtained the approval of the industry and the Ministry of Education.

By limiting the entrants to those candidates who have obtained either (1) General Certificate of Education passes in chemistry, physics and mathematics (two at advanced level and the other at ordinary level) or, (2) an Ordinary National Certificate in metallurgy, engineering chemistry or applied physics, the College, says Mr. Bamford, will ensure that all students possess an academic background which will enable them to take full advantage of the tuition given during the course.

Scope of the Course

In detailing the scope of the course, Mr. Bamford points out that a foundryman of to-day needs a knowledge of many other technologies and in this connection the sandwich course includes a study, in each of the years, of mechanical engineering leading to the mechanical design of foundry equipment and of castings, of electrical engineering leading to instrumentation and electrical control systems in addition to foundry technology, foundry metallurgy and foundry management.

Other details of the course are that the students in the final year will be required to conduct an investigation into a problem connected with some branch of foundry technology. The aim being to train the students to bring all their knowledge to bear on a specific problem, to search the literature for relevant information, to carry out the experimental work necessary, to correlate results and to write a full report. Each student's report will be submitted for assessment and will count towards his final result.

Liberal studies, presentation of information, private study, discussions, foundry projects, and works visits together with the essential ancillary subjects will have their allotted periods, each adding its quota to the technical and general knowledge, overall ability, confidence and personality of the students. The course will extend over three years, six months of each being spent on full-time study in the College and the remainder in the industry.

As already stated, entrants to the new course will have reached General Certificate of Education (Advanced) or Ordinary National Certificate level and their course in the College will be integrated with the industrial experience they obtain between the College periods. Thus the course allows a young man who has remained at school in order to obtain a General Certificate of Education (Advanced level) or who, by part-time study or otherwise, has obtained an Ordinary National Certificate to commence studies and training appropriate for foundry technologists immediately. It is therefore an entirely new scheme of training opening up fresh ways by which the industry can obtain the technologists so urgently required.

How the Industry can Help

The College, says Mr. Bamford, cannot make a success of this course unaided. It requires the full co-operation of everyone concerned and it is hoped that the foundry industry will work as closely with the College in this new venture as it always has done in connection with the existing diploma course. The industry can help in four ways, as follows:

(1) By nominating students for the course and by supporting them during the College periods; (2) by offering facilities for practical training to College-based students, *i.e.*, those who have not been nominated by firms but who are taking the course with financial aid from their Local Education Authorities or from other sources; (3) by arranging, in consultation with the College staff, for the work done by students during the industrial periods to dovetail with their work in the College; (4) by submitting to the College suitable problems for the students to investigate; these could form the basis of the report they will be required to present during their final year.

Full particulars of the new course and also of the existing diploma course, can be obtained from the head of the National Foundry College, Stafford Street, Wolverhampton.

New Overseas Division for F. Perkins

An overseas manufacturing operations division has been formed by F. Perkins, Limited, Peterborough. The new division, headed by Mr. K. E. Woollatt, director of administration, will investigate, organize, and advise on overseas manufacturing projects.

Its duties will include close collaboration with Perkins Engines, Limited, the subsidiary responsible for the marketing of Perkins engines throughout the world; investigating and originating manufacturing projects and licensing arrangements in overseas territories; and organizing technical and planning facilities for starting overseas projects.

British and World Shipbuilding

Lloyd's Register Returns for December Quarter 1959

Steamships and motorships under construction in Great Britain and Northern Ireland at the end of December, 1959, totalled 276 ships of 2,032,600 tons gross, this being 65,164 tons less than the previous quarter and the lowest figure since June, 1956, according to Lloyd's Register Shipbuilding Returns relating to merchant ships of 100 tons gross and upwards. The total comprises 100 ships of 598,240 tons fitting out afloat, and 176 of 1,434,360 tons still to be launched.

The vessels under construction included 46 steamships of 972,443 tons and 230 motorships of 1,060,157 tons. In other Commonwealth countries there were under construction 8 steamships of 101,880 tons and 37 motorships of 116,385 tons.

Oil tankers building in Great Britain and Northern Ireland totalled 60 ships of 986,796 tons, which is 38,094 tons less than in the September quarter, and represents 48.5 per cent. of the total tonnage under construction in this country. Total construction in hand in the principal districts is indicated in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	December 31, 1959.		September 30, 1959.		December 31, 1958.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	17	14,685	17	19,512	14	21,490
Barrow ..	3	92,500	2	67,500	2	67,500
Belfast	15	282,850	14	289,100	16	296,780
Bristol ..	3	4,544	2	3,844	2	4,850
Clyde:						
Glasgow ..	51	475,529	48	484,677	65	517,659
Greenock ..	22	164,519	23	160,620	29	193,910
Dundee.. ..	5	23,923	6	32,128	5	43,100
Hartlepool ..	3	31,690	3	25,710	5	36,240
Hull	37	14,564	43	15,621	39	16,642
Leith	9	42,334	9	40,826	10	49,000
Liverpool ..	11	123,547	13	130,857	11	112,053
Middlesbrough	9	137,172	9	137,632	15	194,164
Newcastle-upon-Tyne ..	31	369,634	33	391,476	36	423,032
Southampton ..	14	12,092	9	10,839	8	8,178
Sunderland ..	23	234,382	30	270,201	24	225,050

The sizes of steamships and motorships under construction in Great Britain and Northern Ireland included the following: 100 to 500 tons, steam nil (92 motorships); 500 to 1,000 tons, steam 2 (17); 1,000 to 2,000 tons, steam nil (11); 2,000 to 4,000 tons, steam 3 (11); 4,000 to 6,000 tons, steam 1 (5); 6,000 to 8,000 tons, steam 1 (21); 8,000 to 10,000 tons, steam 3 (24); 10,000 to 15,000 tons, steam 7 (45); 15,000 to 20,000 tons, steam 2 (1); 20,000 to 25,000 tons, 9 (3); 25,000 to 30,000 tons, steam 5 (nil); 30,000 to 40,000 tons, steam 8 (nil); 40,000 tons and above, steam 5 (nil).

Apart from Communist countries, there are under construction in the world 1,429 steamships and motorships of 9,582,583 tons, of which 21.2 per cent. is being built in Great Britain and Northern Ireland. The present total is 230,974 tons less than last quarter. Oil tankers under construction in the world amounted to 270 ships of 4,870,869 tons (132 steamships of 3,427,178 tons and 138 motorships of 1,443,691 tons), which is 348,794 tons less than in the September quarter, and represents 50.8 per cent. of the total tonnage under construction in the world.

Of the steamships and motorships under construction throughout the world at the end of December, 5,234,214 tons (54.6 per cent.) are to be classed with Lloyd's Register. Of this total 1,979,198 tons, representing 97.4 per cent. of the tonnage being built there, are at yards in Great Britain and Northern Ireland.

Latest Foundry Statistics

Steel Castings: The January *Monthly Statistics* issued jointly by the Iron and Steel Board and the British Iron and Steel Federation shows a rise in employment in steel foundries when the count was taken on December 5. The total was 17,670 representing an increase of 440 on the figures given for November 7. The gain includes, at 560, 30 more females. The percentage of women employees in steelfounding is about 3 per cent., whilst in ironfounding it is about 6.6 per cent.

The production figures of steel castings are always vitiated by an "e" which means estimated. It would not be so bad if the estimated figures were related to current production, but they reach back to 1958. Thus the *estimated* average weekly productions for last year were—in December, 5,000 tons: in November 5,600 tons: for the first 11 months of 1959, 4,900 tons, and for 1958, 5,500 tons. From these *estimated* figures it can be *estimated* that the steelfounders had a pretty good year in 1959. To produce the 5,000 tons per week in December, the industry melted an average weekly amount of liquid steel weighing 10,300 tons. This is quite a good yield.

Light-alloy Castings: With the receipt of the Ministry of Aviation's statistical *Bulletin* for November 1959, it is now possible to estimate last year's production of aluminium-alloy castings. This, it would appear, will be of the order of 93,700 tons which shows a considerable improvement over the 1958 figure of 81,099 tons. This year's figure for the output of magnesium castings can be estimated at about 1,800 tons, the lowest output for many years. The statistics for November show that there were 1,738 tons of light-alloy castings produced from sand moulds; 4,967 as gravity-die and 2,002 as pressure-die-castings—so now sand castings are at the bottom of the list.

Cozens & Sutcliffe's bid for Redler

A counter-bid made for Redler Industries, Limited, referred to in last week's FOUNDRY TRADE JOURNAL, has been made formally by Cozens & Sutcliffe (Holdings), Limited, the Enfield (Middx) structural engineers and contractors. Cozens & Sutcliffe has offered to purchase the ordinary shares of the company on the basis of four ordinary shares of 4s. each of Cozens & Sutcliffe for every five ordinary Redler shares of 4s. each.

The previous offer, by Ley's Foundries & Engineering Company, Limited, Derby, was of 12s. per share in cash.

Cozens & Sutcliffe has for the last five years paid a dividend of 30 per cent. per annum, payable half-yearly, and it is the directors' intention to pay a half-yearly dividend of 15 per cent. on the ordinary share capital as increased as a result of this offer on August 26.

The directors of Cozens & Sutcliffe state that the group's trading results for the six months since June 30 last compare favourably with those for the corresponding period of the previous year.

The directors of Redler Industries, who had unanimously recommended the bid by Ley's Foundries, and have agreed to accept in respect of their own holdings, have announced that if the Ley's offer should not become unconditional they intend to accept the Cozens & Sutcliffe offer in respect of their holdings.

British Oxygen Prospects

General increase in home sales in the first quarter of the current financial year may become greater as the year goes on, states Mr. J. S. Hutchison, chairman of the British Oxygen Company, Limited, in his annual review. Profit growth in the home gases division is likely again to be moderate, but profits from chemicals, equipment, and electric welding should show improvement.

Profits of overseas associated companies now represent almost half the group's total earnings.

New contracts for the supply of industrial gases to the steel industry have increased commitments for three years from £24,000,000 to £28,000,000 and this new programme is expected to be financed without the need to issue further share or loan capital.

Provided there is no unexpected change in the situation it is intended to raise the interim from 4 per cent. to 6 per cent., solely to provide a better balance between interim and final payments. The dividend for the year ended September 30, 1959, is effectively raised by 2 per cent. to 14 per cent. with a 10 per cent. final. Group net profits expanded to £4,521,390 (£3,334,062).

Madrid Congress Papers

From the Spanish magazine, *Fundicion*, comes the information that supplies are available of bound sets of copies of the papers presented to the Madrid International Foundry Congress at the price of 60s., or about 62s., post free. The Editor, Mr. V. Aguirre Gonzalez, adds "You should make it clear that two sets of papers were presented to the Congress—one set contains the Congress papers and the other one carries the papers presented to the Iron and Steel Institute, which are not of specific foundry character. This remark might be useful for foundrymen keen on saving money, just in case someone is found with money to save." The address of *Fundicion* is Rafael Calvo 5, Madrid, Spain.

Thorncliffe Apprentices' Cupola

Made by a team of six apprentices at the Thorncliffe Works of Newton, Chambers & Company, Limited, Sheffield, a miniature cupola is to be installed in new buildings at the Rotherham College of Technology during the course of the next few weeks. The cupola was made in the summer of 1958 and has been stored at Thorncliffe until the new buildings were ready to receive it.

The fourth of its kind, the cupola is similar to the one, also made by Thorncliffe apprentices, which is in use in the foundry department of the Newton, Chambers training centre. A third, made by Thorncliffe apprentices, is now in use at the North Lindsey Technical College, Scunthorpe, and another was built for training purposes by a firm which asked Newton, Chambers to supply the plans.

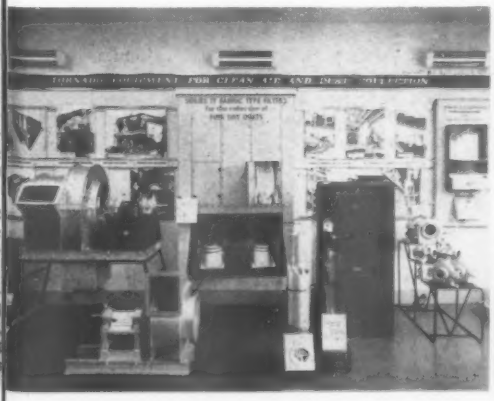
The Rotherham cupola was constructed under the supervision of Mr. H. Currie, constructional instructor at the training centre, in consultation with Mr. H. Pinder, foundry instructor.

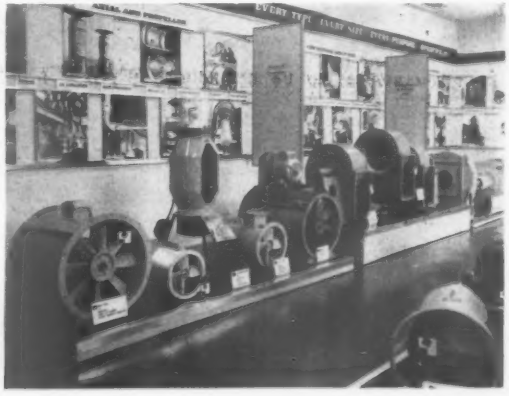
Licensing Agreement for Albert Mann

Albert Mann Engineering Company, Limited, of Basildon, Essex, announce the conclusion of a licensing agreement with Loma Machine Manufacturing Company Inc., and its subsidiary, Lobeck Casting Processes Inc., of New York City, under which Albert Mann will supply Loma and Lobeck metal-processing equipment to all parts of the British Commonwealth, exclusive of Canada, and the Outer Seven countries of the European Free Trade Association. The company also announce that they have taken over the whole of the share capital of Roll Race Conveyors, Limited, late of Jacob's Well Mews, London, W.1, and with it the right to manufacture and sell conveyors and handling equipment incorporating the patented Roll Race system of rolling loads.

Keith Blackman's Permanent Exhibition

The new permanent exhibition of Keith Blackman, Limited, at Mill Mead Road, Tottenham, London, N.17, houses a very wide selection of the company's fans and ancillary equipment. In the main section, the Tornado range of fans is displayed, including axial, centrifugal, and propeller types, together with blowers and exhausters. Another section is devoted to equipment concerned with implementing the conditions of the Clean Air Act, whilst in another industrial gas equipment is shown. In the illustrations below can be seen (left) equipment in the "Clean Air" section; on the left, is a model of a combined induced-draught and grit-arrester fan; in the centre, a series TF fabric-type filter, and to the right of this, a T-1100 dust-exhaust and collecting unit. The right-hand picture shows groups of fans in the smaller sizes.





News in Brief

R. W. CRABTREE & SONS, LIMITED, have received an order from the *Birmingham Post and Mail* for a complete newspaper printing plant. The value of the order approaches £2,000,000.

THE FIRST STAGE of its five-year-plan for the creation of smokeless zones is being put into operation by the Chesterfield Corporation. The plan will cost about £500,000 of which the authority will pay about £140,000.

WASHINGTON REPORTS that world steel output rose by 10 per cent. to a record 318,000,000 tons last year. New records were established in Canada, Japan, the USSR, West Germany, France, and the Benelux countries.

A CONTRACT for the supply, fabrication and delivery of steelwork for Bridge No. 80 on the Trent Valley line, has been placed with the Butterley Company, Limited, of Ripley, by British Railways (London Midland Region).

Mr. JOHN HAY WHITNEY, United States Ambassador, was the chief guest at the Leeds Chamber of Commerce annual dinner at the Queens Hotel, Leeds, on February 11. He also made a tour of Kirkstall Forge Engineering, Limited, Leeds, earlier in the day.

CHARLES CLARK & SON, LIMITED, Chapel Ash, Wolverhampton, Staffs, a member firm of the Owen Organization, announce the acquisition of a subsidiary company: Bull Stake Motors (Darlaston), Limited, Wednesbury Road, Darlaston, South Staffs.

PRODUCTION LAST YEAR of the Norwegian State-owned iron and steel works of Norsk Jernverk was about 25 per cent. above the 1958 level. Compared with the previous year, 1959 production was up by 35 per cent. for pig-iron, 16 per cent. for raw steel, and 40 per cent. for sheet iron rolled products.

AT THE ANNUAL GENERAL MEETING of Taskers (Andover 1932), Limited, Sports and Social Club over which Mr. A. B. Fuller, the company's managing director, presided, the honorary secretary of the club, Mr. P. H. Holland, tendered his resignation and was presented with a cheque for £30. His office is taken over by Mr. J. Tuson.

THE FIRST CANADIAN ORDER for the Titromatic analyser, manufactured by Electronic Instruments, Limited, Richmond, Surrey, valued at over £2,500, has been received from the Canadian Aluminium Company, Limited. The first of these units to be supplied to North America was delivered a few months ago to the Esso Refinery, Baton Rouge, Louisiana, USA.

GUIDANCE for those about to take up positions overseas is being given by Oversea Service in a series of residential courses to be held during the next few months. The countries to be covered are the Caribbean, East Asia, East and West Africa, Latin America and the Middle East. Details are available from the London office of Oversea Service, 2 Eaton Gate, London, S.W.1.

H.R.H. THE DUKE OF EDINBURGH is to visit the factory of S. Smith & Sons (England), Limited, at Bishops Cleeve, Cheltenham, on February 26 where he will be received by the chairman, Mr. Ralph Gordon-Smith. During his visit he will see the production of watches and aviation instruments and will spend some time in the research and development departments of the factory.

AN ORDER FOR VALVES worth £50,000 for the Athens water system has been received by Cockburns, Limited, Glasgow. The order, which has been in negotiation for some months, was won against competition from Continental and American firms. The valves to be supplied are from 4 to 6 ft. dia. made in Meehanite iron with special rubber seats. They are based on US designs which Cockburns manufacture under licence.

THE BAXI-OIL, an oil-fired central-heating system, is shortly to be marketed by Richard Baxendale & Sons, Limited, Chorley, Lancs. The system, the first of its type in this country, is only 2 ft. sq. and can be fitted into a cupboard in almost any position in the house; the oil storage tank is usually kept outside the house. Maximum output of the system is 32,000 B.T.U.'s per hour, and oil consumption is between 9/20th pints and 2 pints maximum per hour.

Mr. F. J. ERROLL, Minister of State, Board of Trade, toured the works of Buckley & Taylor, Limited, Oldham, a member of the Brightside group, Sheffield, on February 12. He saw a scale model of the world's biggest single-unit distillation plant which the firm is building for installation at an oil refinery of the Compania Shell de Venezuela, at Cardon, Venezuela. The plant will be capable of producing 1,200,000 gall. of fresh water daily from sea-water, sufficient for a town of 25,000 people.

Dr. BREWIN, intelligence officer of the British Iron and Steel Federation, spoke to members of the Sheffield branch of the Institute of Management on February 12 on "Communications." He referred to the work of the Federation's intelligence department, which, as well as supplying information from many sources, has also been responsible for the publication of much material on the state of the industry abroad. "Trade and industry in this country," he said, "are better served by their Press than in any other country in Europe."

Mr. GEORGE H. B. WILSON, chairman and managing director of Raleigh Industries, Limited, announced on February 10 that the company had reached agreement with Carlton Cycles, Limited, Worksop, Notts, for the purchase of the whole of the issued share capital of that concern. He said that the production of the hand-built bicycles on which the reputation of Carlton cycles was based would continue as an entirely separate operation in the existing factory at Worksop. Mr. Reg Harris, the former world cycling sprint champion and professional rider for Raleigh Industries, is joining the board of Carlton Cycles, Limited, in a sales and consultative capacity.

Obituary

Mr. FRANK BERNARD HOLBERRY, who has died at the age of 60, was assistant manager of the Llanelly Foundry & Engineering Company, Limited.

Alderman A. Y. MCGHIE, J.P., formerly a departmental manager at Herbert Morris, Limited, engineers of Loughborough, has died at the age of 76.

The death has occurred at the age of 64 of Mr. LEONARD CHARLES MERCER, formerly for 40 years a director of Edward Mercer, Limited, ironfounders and nut and bolt manufacturers, Hollins Road, Oldham.

Recent Will

WEST, SIR FREDERICK J., late chairman of West's Gas Improvement Company, Limited, and West's Piling & Construction Company, Limited, and a director of the Derbyshire Silica Firebrick Company, Limited, and a former chairman of the Manchester Ship Canal Company, president of the Institution of Gas Engineers, 1941-42, chairman of the Society of British Gas Industries, 1910-11, and its president, 1946-47 ... ... £52,328

Allied Ironfounders' Development Plan

A full-scale modernization scheme being considered by the Allied Ironfounders group, will affect five of the company's foundries in Scotland. Two, which had been closed down during the recession, will reopen, two others will be closed permanently; and a fifth will be completely modernized. The Callendar Abbotts and Forth & Clyde works will be closed but improved production methods will allow their manpower and output to be absorbed in the reopened Dobbie Forbes works. They will be completely re-equipped for making cooking and heating appliances.

The McDowall Steven's works will also open again, after modernization, and will produce rain-water and soil goods. The other development will be at the premises of M. Cockburn & Company, where £250,000 worth of new mechanized plant is to be installed for the production of cast-iron baths. It should be in production by the beginning of 1961, and will be one of the most up-to-date plants in the country.

This will see the first stage of the Allied Ironfounders' development completed. Another new project, involving a different type of product, is planned for the Falkirk area, and should be in production before the end of next year.

A senior executive of the company's northern group said, "It has been a problem for us to decide how far we could maintain production in Scotland at all. The bulk of the allied sales are in the Midlands and south of England and it seemed more logical to develop our works in these areas. On the other hand, it would not be possible to give adequate service to customers in Scotland and northern England without Falkirk. We also felt that we could not just walk out of the area when some of our foundries had been established for a century or more." He added that "even a partial close-down might have had a serious effect on the community."

Forty Years Ago

In the January, 1920, issue of the JOURNAL there was published an article on the production of centrifugal castings, by the De Lavaud process, in São Paulo, Brazil. Already the process was extending to the USA and Canada and was being used for both pipes and piston rings. There was also in this issue a description of the new steel foundry of Thwaites Brothers of Bradford, but this was only in existence for about a year when, in common with many others at that time, it closed down. Amongst new companies registered there were the following:—Precision Castings, Limited, Wolverhampton; Hartleys Malleable Fittings Company, Limited, Halifax; Vowles Brothers, Limited, West Bromwich, and Clyde Alloy Steel Company, Limited, Motherwell.

In the issue of February, 1920, was reported the foundation of the Institute of Costs and Works Accountants. The papers published in this JOURNAL except for a practical contribution by Ben Shaw and James Edgar are of but little interest to-day. The registration of the Butler Machine Tool Company, Limited, was noted.

TAYLOR BROS. & COMPANY, LIMITED—Mr. A. Y. Johnson, who joined the company as an apprentice in 1925, has been appointed a director. In 1936, Mr. Johnson became manager of the wheel department and in 1949 he was also appointed manager of the axle department.

Metallurgical Abstracts

Alloy and Technique-control Structure of Ductile Iron. ANON. ("Steel." 1959. Vol. 145; No. 13; p. 137.) Producers of ductile iron are getting higher and more uniform magnesium recoveries by treating base iron with a new, richer magnesium alloy, and using better addition techniques. This method was developed in Germany. Addition is made by plunging the alloy into molten iron.

The alloy, in a light-gauge steel container, is fastened in a refractory bell and plunged deep into the iron. The bell resembles an inverted crucible, attached to a refractory-covered vertical shaft. Holes in the sides of the bell permit magnesium vapour to escape and bubble up through the molten iron. Part of the vapour is absorbed by the iron.

A high magnesium content of 30 to 32 per cent. often permits a smaller plunger or bell to be used. This minimizes temperature losses and equipment cost. High-magnesium to silicon content makes the alloy useful in treating acid-cupola iron. Sufficient magnesium can be added to remove sulphur and produce a ductile-iron structure without exceeding silicon specifications. As the alloy has a silicon base, a ferritic iron can be cast with high ductility.

Use of Malleable-iron Castings for 650 deg. C. Service. H. J. HEINE. ("Steel." 1959. Vol. 144; No. 26; p. 85.) Research proves that malleable irons have good physical and mechanical properties up to 650 deg. C. Both ferritic and pearlitic types have been tested up to 2,300 hr. Pearlitic malleable irons appear equal or superior to unalloyed irons.

The stress/rupture curves for malleable irons do not reach a point at which they break sharply. Instead, they continue at a uniformly slight rate of decline beyond the breaks in the curves for some other materials. The tensile strength of malleable iron shows little change with temperatures below 370 deg. C. There is a high level of stress versus rupture time, equal or superior to other ferritic cast materials, particularly at 430 deg. C.

There was no evidence of abrupt changes in behaviour or structure during test periods of one to over 2,000 hr. All samples exhibited highly ductile properties and small likelihood of transitions or structural changes. The values obtained for pearlitic-malleable irons compare favourably with those published for molybdenum-alloyed irons. Pearlitic malleable irons appear equal to alloyed high-carbon materials containing up to 0.5 per cent. Mo, which has been added to enhance their elevated-temperature properties by stabilizing the carbide phase.

Peglers, Limited, brassfounders, Doncaster celebrate their 60th anniversary this year. The company's progress over the years is outlined in the current issue of the works magazine. The firm was founded by Mr. F. Birchall, who became managing director from 1899 to 1938 and then chairman until 1947. He had one man to help him when he started; the present number of employees is more than 1,500. In the second world war when the firm produced fuses and carried out Air Ministry contracts there were 2,161 employees and continuous shift-work.

Book Reviews

Extractive Metallurgy by J. Newton. Published by Chapman & Hall, Limited, 37 Essex Street, London, W.C.2; price 78s. net.

In US parlance, extractive is the forerunner of adaptive metallurgy, so this textbook begins with the earth's crust and stops at ingots. It covers the extraction of all the metals from copper to uranium and wisely includes a few pages on scrap treatment and the subject of metal prices. It is remarked that a research department might improve a process and save a large sum, which could then be completely nullified by a slight drop in metal price. This presents a touch of realism for the student, but it is not clear what he is supposed to do about it.

The attractive aspect of this book is the adoption of the unit process method of approach rather than going from metal to metal. In the chapter on pyrometallurgy for instance, the text proceeds from hearth roasting and flash roasting to blast roasting and the iron blast-furnace and the Bessemer process. The chapter on "Ingots" outlines open-mould casting, continuous casting of copper cakes, arc melting of titanium ingots and vacuum casting, but the author explains that it was not entitled "Casting" because the foundry variety is omitted.

A chapter on "Chemical Principles" includes outlines of thermochemistry and thermodynamics, with some everyday-type of calculations as examples. Considerations of free energies and equilibrium constants for reactions are on the elementary side for British university purposes. Nevertheless this work by Professor Newton of Moscow, Idaho, is interesting and lively. It is up-to-date and describes the Avonmouth Zinc blast-furnace.

Included in its 500 pages are 30 on fuels and refractories, and more surprisingly, 90 pages of physical metallurgy entitled "The Structure of Metals and Alloys." The latter gets down to details such as superlattices, thermal analysis, the martensite reaction, etc., and is surely out of place in a book with the present title.

It was perhaps intended to produce a work on "General Metallurgy," and as such the result is good. The flow-sheets, line diagrams and half-tone pictures are very satisfactory and the index is excellent. It is one of the trials of life that the striking photograph which adorns the book's jacket is printed upside down on page 499.

HUGH O'NEILL.

British and Foreign Specifications for Steel Castings (Part I). Published by the British Steel Castings Research Association, East Bank Road, Sheffield, 2; price 40s. or $7.50.

Part I of this book summarizes the national specifications for steel castings for Austria, Belgium, France, East and West Germany, Great Britain, Sweden, Switzerland, and the USA. Its publication at this time when the question of European free trade is attracting increasing attention is of great significance. In the offices of the JOURNAL, queries are often received as to the British specification equivalent to some overseas standard, but these must be of much greater proportion in the offices of manufacturers. Wisely all the specifications are given in both metric and British units. Comparisons are made between foreign and British specifications on account of similarities which exist in chemical compositions, or mechanical and physical properties, or both, but these are only a rough guide. It is an interesting commentary that throughout ferrous metallurgy, the Americans seem to require a little more carbon for any given job than is usual in this country. Readers of this book are asked to make suggestions for improvements or to point out any errors, typographical or otherwise—if there be any. Having found none of the latter, the reviewer puts forward the idea that a list of overseas steelfoundry associations should be included, as such bodies are better placed to explain the working of the specifications than the legally-minded authorities sponsoring their issue. Foundry organizations, other than those catering for steel, could usefully turn their attention to the issue of similar brochures.

V. C. F.

Le Controle Non Destructif par Gammagraphie (Non-destructive Testing by Gamma Radiography), by Albert Blondel (in French), published by Editions Techniques des Industries de la Fonderie, 12, Avenue Raphaël, Paris XVI; price 3,750 french francs, post free.

A large increase in the use of radio-isotopes in industrial radiography has occurred during the past decade. During this period, only a limited number of books have appeared, these only partially covering this most important aspect of non-destructive testing. The issue of this authoritative and comprehensive text, therefore, is very welcome to all concerned with this subject.

After an adequate introductory section dealing with the atomic structure of matter and radioactivity in general terms, detailed attention is given to the various isotope sources available and their preparation. Radiographic procedures and the use of penetrameters are well described, and guidance is given on choice of X-ray films, exposure times and photographic development.

It is not the objective of the book to illustrate the interpretation of radiographs, but a few examples are given of defects in castings in a short chapter, which also mentions the examination of welds. Protection against the effects of the radiations has been dealt with generously and the information that is provided will be of considerable assistance to anyone planning a building for isotope radiography.

The book is well produced and illustrated, with generous graphical presentation of data and good half-tons illustrations. The final bibliography is up to date and refers to papers published as recently as July 1959.

A. H. SULLY.

Proceedings of the Eighth Symposium on the Iron and Steel Industry in India, organized by the National Metallurgical Laboratory (at Jamshedpur). Edited by R. M. Krishnan and published by the Technical Journals of India, Private, Limited, 24, Brabourne Road, Calcutta 1 (price not stated).

This conference attracted metallurgists from all over the world, many of whom contributed papers. As over 50 of the papers are printed the result is a volume running to nearly 500 pages. Rightly, as there is an Institute of Indian Foundrymen, papers dealing with the cast product were excluded. For the general reader this symposium gives an excellent picture of the present position of the heavy metallurgical industries and carries many pointers for their future development in India.

OPPORTUNITIES FOR TRADE between Great Britain and Canada were outlined by Mr. G. A. Drew, High Commissioner for Canada, at a Birmingham Chamber of Commerce luncheon last week. He urged those who were looking for overseas markets to remember that *per capita* Canada had the highest international trade and was the fourth trading nation in the world.

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New Catalogues

Electric Muffle Furnaces. Carrving the caption "Standard High Temperature Furnaces," Metalectric Furnaces, Limited, Cornwall Road, Smethwick 40, Staffs, describe and illustrate, in publication No. M.9B, a four-size range of electrically-heated resistance furnaces for use in either laboratory or workshop. Through the use of silicon-carbide elements, operating temperatures up to 1,400 deg. C. are obtainable in these units. The illustrations show the plant to be of pleasing compact design.

Electrode Salt-baths. A second leaflet received from Metalectric Furnaces covers two ranges of salt-bath furnaces, there being five in the high-temperature range, and six in the medium. In the former range, temperatures are obtainable up to 1,350 deg. C., and in the latter from 700 to 1,000 deg. C. Though the use for salts in malleable-iron castings at one time looked promising, the system has failed to mature; they are, however, finding increasing application in the heat-treatment of the newer high-duty irons. For the type of bath dealt with, electrodes are used as the source of heat.

Water Towers. Three leaflets have been received from the Midland Heating & Ventilation Company, Limited, Bedford Road, Birmingham 11, each one describing a different type of cooling tower, although all three units carry the trade name Aquamiser. The smallest cooling tower carries the additional mark "Woodpack," the next in size the name "Zed-pack" and the largest ones "Spraypack." For all of these it is claimed that they save "up to 97 per cent. of the water to be used." As water-cooling is becoming more and more common in metallurgical operations, the demand for these compact cooling towers becomes more insistent, especially for die-casting machines. The leaflets are tastefully presented, a different colour scheme being used for each one.

Potentiometer Recording Controllers. Ether, Limited, Tyburn Road, Erdington, Birmingham 24, have used a six-page folder to illustrate and describe the Xactrol range (series 2,000) of potentiometer recording controllers. A specification is included which details such matters as pen speed, thermocouple burn-out protection, cold-junction compensation, calibration, sensitivity, chart speed and life (a month at one inch per hour) and many other aspects. For adjustment, the apparatus slides out of its casing in the manner of a drawer. These instruments for controlling temperatures ranging from −200 to +2,000 deg. C. show many interesting features.

Pressure Vessels. In catalogue No. 544, Hadfields, Limited, East Hecla Works, Sheffield 10, cover very completely the use of forgings, steel castings, fabrication, iron castings, and centrifugally-cast steel, iron and non-ferrous alloys for pressure vessels. It is well illustrated by examples of components made by all these processes—some of those produced by centrifugal casting are particularly impressive.

Overband Magnetic Separators. In publication No. 123R, Rapid Magnetic, Limited, Lombard Street, Birmingham 12, illustrate and describe two main types of overband magnetic separators. Type CB operates above and at right angles to the material flow, whilst type DB separators are installed at the terminal head in line with the material. The former is the type most commonly found in foundries, and this comes in 14 sizes based on the width of the conveyor belt. Some useful notes for the installation of the separators are included.

Dust Collection. Publication No. 80, issued by W. C. Holmes & Company, Limited, Turnbridge, Huddersfield, describes and illustrates the Holmes-Schneible multi-wash system for the collection and cleaning of dust-laden gases and fumes. The diagrams used for illustration are particularly clear and informative. An extraction efficiency of 99 per cent. for all particles larger than three to four microns is claimed for the system.

House Organs

Inco-Mond Magazine, No. 12. Published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This is a very interesting issue. It opens with a short story about bits, spurs, and stirrups—which are now being made in stainless steel—and this is followed by a note on the expanding market for spanners made from s.-g. iron. There are then two articles on special-duty valves, in the first instance the components are made of stainless steel and in the second, nickel-bronze. An article of special interest to founders is the description in this magazine of Cronite's new foundry at Crewkerne which uses a pair of Birlec 300 kva. 16-cwt. furnaces for melting. For moulding there are two electronically-controlled, pneumatically-operated Coleman-Wallwork moulding machines, and one, pneumatically controlled and operated, made by the British Moulding Machine Company. A Pneulec Royer is used for sand preparation and an Acme conveyor services the moulding machines. A standard Coleman-Wallwork machine is used for shell moulding, whilst in connection with the CO_2 Process, a Vortec coresand mixer by British Foundry Units, Limited, is available for processing the special sands. The article is illustrated by colour pictures.

The Iron Worker, Vol. XXIV, No. 1. Issued by the Lynchburg Foundry Company, Lynchburg, Va., USA.

The reviewer congratulates the *Iron Worker* on the fortieth anniversary of its first issue which carried the date of December, 1919. To mark this event, the Editor has reproduced in its entirety the first issue as a central insert. This magazine is invariably interesting as it usually divides itself into three separate sections. The first is almost always of historical interest, for it should be remembered that the story of Virginia goes back to Elizabethan days, the second usually covers the technical developments of this great pipe foundry, and finally, notes about the staff are recorded. The cultural contributor to this issue of the magazine details the story of the first 50 years of Alexandria, a town established in 1749. Some of the property erected during this period merits the appellation of beautiful.

Hawker Siddeley Technical Journal, Vol. 1, No. 3. Published by the Hawker Siddeley Group, Limited, 18, St. James's Square, London, S.W.1.

An interesting feature of this technical "glossy" magazine is the genealogical tree of the ramifications of the Hawker Siddeley Group. Fortunately, it has been somewhat simplified to exclude the overseas selling subsidiaries. The *Journal* carries 16 well-illustrated articles dealing, without being too technical, with ships, aeroplanes, transformers and a number of engineering products. The production of the magazine is excellent.

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Iron and Steel

There is little change in the pattern of business at the ironfoundries. High-quality castings comprise comparatively the major requirements of consumers. The demands from the motor vehicle trade have shown no relaxation over a long period and the foundries' delivery schedules continue on an increasing scale. Production is at capacity levels, although in common with other industries, the amount of suitable labour available is a controlling factor.

Up to recently the engineering and speciality foundries catering for the machine-tool industry have not been favourably employed, but there is now a definite improvement.

The steelworks are also calling for larger tonnages of castings and many other busy trades are indenting for a sufficient quantity of castings to enable the foundries to obtain good outputs. There is, however, little, if any, improvement in the demands from collieries and railways.

The requirements of pig-iron by the engineering and speciality foundries are in the main being satisfied. They are taking up substantial tonnages of low-phosphorus irons as well as good tonnages of hematite and some refined irons. Available supplies of the low-phosphorus irons appear adequate to meet requirements, but there is little stock on hand at either the furnaces or the foundries and current deliveries go into immediate consumption. On occasions the foundries are inconvenienced due to the lack of stocks and also to delays in despatch as deliveries are almost entirely dependent on current outputs. The furnaces recently burdened for this iron are now increasing their outputs and with the bigger tonnage which will be obtained shortly from increased furnace capacity, the supply of the low-phosphorus irons should show improvement.

Makers of hematite pig-iron are very busy and are able to dispose of their outputs. The reduction in price of hematite to all zonal areas by 15s. per ton occasioned no surprise in view of the pressure which has been made for some months as it was considered that the price of hematite was much too high in comparison with the low-phosphorus irons. In some quarters the price reduction was expected to be greater as the differential between the two irons for delivery in the Birmingham area is still £2 9s. per ton.

The light foundries supplying castings to the domestic and heating appliance trades continue to be reasonably well employed, and there is also a fairly good demand for builders' castings. Most of the jobbing foundries are also fairly busy, but the textile foundries, although showing some improvement, could do with more work. High-phosphorus pig-iron producers are able to meet present demands without difficulty, and in addition continue to supply overseas buyers with reasonably good tonnages.

There is a heavy demand for arisings of suitable parcels of steel and cast-iron scrap, particularly for heavy cast-iron and machinery scrap. Foundry coke deliveries are satisfactory, and ganister, limestone, and firebricks are in good supply.

The re-rollers are maintaining good outputs for all their products, and the orders now on hand ensure production at present levels for some months ahead. There is, however, a shortage of suitable labour at some establishments. Good demands continue for small bars and light sections, and the re-rollers supplying reinforcing rods are very busy.

Home steelworks are supplying regular deliveries of steel semis, but supplies generally are below the tonnage called for, particularly for the smaller sizes of billets. All arisings at the steelworks of suitable re-rolling quality material are readily accepted by the re-rollers.

Non-ferrous Metals

The long strike in the US copper industry is now virtually settled—only Phelps Dodge's Laurel Hill, New York, copper refinery still being idle. Last week, after months of negotiating with the Mine, Mill and Smelter Workers' Union, Phelps Dodge—with the above noted exception—and Anaconda cleared up their outstanding difficulties and came to terms. The London market was affected by the peace announcements, but not so much as everyone expected. At one point last week the copper market opened at £280 a ton, but this did not last long and prices fell back sharply. However, realization that, despite the US industry being potentially back in business, physical copper is in short supply and stocks have been run down severely on both sides of the Atlantic firmed up the market and the price has recovered well.

There has been no change in the US copper price structure, producers quoting 33 cents and custom smelters 35 cents a pound. The outlook immediately ahead is good and also encompasses an early settlement of the Phelps Dodge's Laurel Hill, New York, copper refinery strike. The London market is now active, but it is difficult to see how the present price levels can be maintained. The outlook is for an orderly retreat in the quotations. On the other hand, this will not come about in so far as the cash price is concerned until supplies are more readily available. LME stocks are less than 4,000 tons.

Tin is a firm market in London, in the East, and in New York, where the price is around $1.01 a pound. The Eastern quotation at Singapore has been helped by direct US buying, mainly from the tinplate industry, and this has gone a long way to vindicating the International Tin Committee for its optimistic action in raising the exportable quotas for the first quarter of this year. Some observers feel that the world offtake of tin in 1960 will be in excess of production and, if so, this will raise the question of whether the buffer stock manager will be forced to run down his stocks to nil.

Lead has been somewhat patchy owing to sporadic arrivals of metal from the Continent. Turnover has expanded and movements in the price, though small, are sharp. At present the cash price is hovering around £74 a ton. The US market is quiet, with the price called 12 cents a pound.

Zinc is a steady market, with the statistical position still sound. Turnover in London is fairly large and the price is trying hard to go above £90 a ton. The US market is steady, with demand continuing good for special high grades. The US price is 13 cents a pound.

IBF Slough Section—Annual Social

This year the annual social event of the Slough section of the Institute of British Foundrymen will take in a visit to the Cinerama presentation of a "South Seas Adventure," and dinner and dancing at the Regent Grill, Piccadilly, London. The function will be held on Saturday, April 30, and arrangements have been made for members to be picked up by coach at 4.30 p.m., at the Slough Social Centre, Farnham Road. Arrival at the Cinerama theatre is scheduled for 5.45 p.m., and dinner at 8 p.m. The section is very happy to extend invitations to members' ladies. The cost per head will be 37s., and those wishing to attend should make immediate application to the secretary, Mr. R. J. Bown, 5, Cape of Good Hope Road, Chalvey, Slough.

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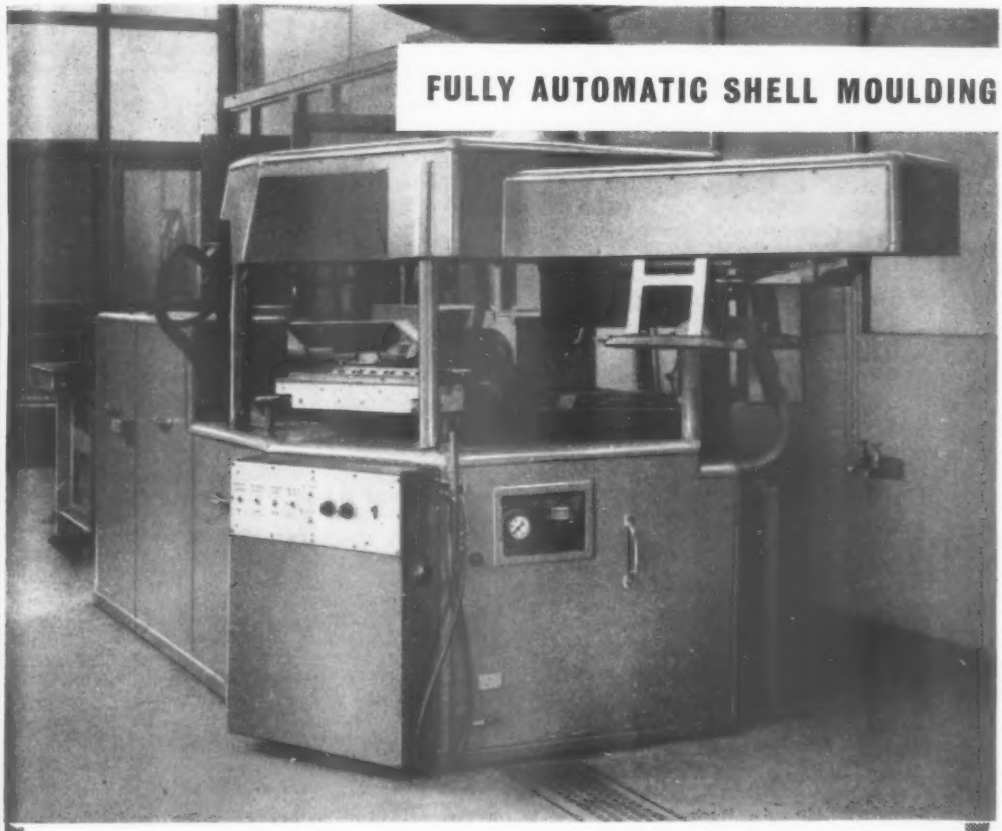

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

February 17, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 0d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 0d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¼d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

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Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68–70 per cent.

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Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d., nickel-chrome, £99 4s. 0d.; nickel chrome-molybdenum £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £266 10s. 0d. to £267 0s. 0d.; three months, £248 5s. 0d. to £248 10s. 0d.; settlement, £267 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 7½d. per lb.; rods, 289s. 6d. per cwt. basis; 20 s.w.g., 324s. 6d per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £793 10s. 0d. to £794 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—Second half February, £73 17s. 6d. to £74 0s. 0d.; second half May, £74 0s. 0d. to £74 2s. 6d.

Zinc.—Second half February, £88 0s. 0d. to £88 2s. 6d.; second half May, £88 5s. 0d. to £88 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £124 10s. 0d.; rolled zinc (boiler plates), all English destinations, £122 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £102 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 1½d. per lb.; sheets to 10 w.g., 228s. 3d. per cwt.; wire, 2s. 11½d.; rolled metal, 228s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £169; B6, £226.

Brass (High Tensile).—BS1400, HTB1, £205; HTB2, £223; HTB3, £236.

Gunmetal.—BS1400, LG2, £217; LG3, £226; G1, 1%, £285; G1, 1%, £272.

Phosphor Bronze.—BS1400, PB1 (AID released), £320; BS1400, 90/10/1, £301.

Leaded Phosphor Bronze.—BS1400, LPB1, £235.

Phosphor Bronze Strip, etc.—Strip, 328s. 9d. per cwt.; wire, 4s. 5d. per lb.; rods, 3s. 8d.; tubes, 3s. 8d.; chill cast bars; solids 3s. 7½d.; cored 3s. 8½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 1½d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 6¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 5½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 0s. 0d. to £71 10s. 0d. Nickel, £600 0s. 0d. Aluminium. ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £268; AB2, £277.

Nickel Consumption in 1959

Free world consumption of nickel in 1959 exceeded 400,000,000 lb., or about 25 per cent. above the 1958 figure, states Dr. John F. Thompson, chairman of the International Nickel Company of Canada, Limited, in a review of the industry. Despite a substantial rise in consumption and the uncertainties in Cuba, he believes supplies will continue to be ample to meet demand.

In 1959 producers reached an anual capacity of 550,000,000 lb. and present development programmes are likely to increase this by a further 100,000,000 lb., or 18 per cent. It is estimated that three quarters of the increase will come from Inco's new mining project at Thompson, Manitoba.

Accounting for over 70 per cent. of supplies to the free world market, Canada continues to be by far the largest supplier to the US, the UK, and other users.

The directors of International Nickel have raised the quarterly dividend on the common shares to 75 cents a share in US currency, payable March 21 to shareholders on record on February 23. Previous quarterly dividend payments have been at the rate of 65 cents per share, unchanged since September, 1955.

The directors also recommend that the company's shares be split on a two-for-one basis and they announced that upon this action being taken by the shareholders, it was expected that the new shares would carry a quarterly dividend of 37½ cents per share assuming continuation of the current outlook. The expected quarterly dividend on the new shares would total $1.50 a year, equivalent to $3.00 a share on the present shares.

Daily Mail Ideal Home Exhibition

The Daily Mail Ideal Home Exhibition will again be held at Olympia, London, the period this year being from March 1 to 26. Ironfounders' exhibits will include that of Allied Ironfounders, Limited, who will be showing on Stand Nos. 130 and 132, a wide variety of fires, air heaters, boilers, cookers and baths. A feature of the exhibit of the Radiant Manufacturing Company, Limited, will be the "Radiant Pad" for use on ironing boards. This pad, which is made of aluminium, reflects heat so that garments can be ironed on both sides at once.

Other exhibits of general interest to founders, are the Safetymaster home-power unit and accessories to be shown by Wolf Electric Tools, Limited, and the selection of power-tool attachments and hand tools being shown by the Surform division of Firth Cleveland Tools, Limited. Wheelbarrows, steps and ladders, in steel and aluminium, will be exhibited by H. C. Slingsby, Limited, and H. S. Langton and Drew, Clark & Company, Limited, will be displaying their ranges of ladders and stairways.

Board Change

WEYBURN ENGINEERING COMPANY, LIMITED—Mr. H. Gordon, who retired as chairman of the company, has been succeeded by Lt.-Col. P. H. Bentley. Mr. Gordon had previously retired from the position of managing director and Mr. J. T. W. Scruby and Mr. H. R. Coverley have been appointed joint managing directors.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

YOUNG MAN (30), well educated, Diploma National Foundry College, seeks position as Assistant to Foundry Manager or similar. London or Home Counties.—Box YM418, FOUNDRY TRADE JOURNAL.

FORMER CHIEF DRAUGHTSMAN for one of the largest foundry mechanisation firms in England offers his experience and capabilities for advising or full-time executive capacity. Box FC411, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE with extensive connection in London & Home Counties with large industrial groups wishes to represent a Foundry for cast iron non-ferrous die-castings, etc. Personal connection, commission and expenses. Box TR405, FOUNDRY TRADE JOURNAL.

ADVERTISER, 44, desires change. Manager or Assistant Manager. Eleven years managerial experience in ironfoundry producing castings up to 40 tons. M.I.B.F. Box AD406, FOUNDRY TRADE JOURNAL.

PRACTICAL FOUNDRYMAN, age 39, M.I.B.F., C. & G., returning U.K. April, seeks post, MANAGER/ASSISTANT MANAGER. Wide experience grey iron and non-ferrous castings. Fourteen years' executive experience U.K. and overseas. Excellent references. Box PF404, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

PATTERNMAKERS—Wood and Metal—required. Coventry area. High rates, bonus, ideal conditions. Box PW341, FOUNDRY TRADE JOURNAL.

APPLICATIONS are invited for the position of FOUNDRY SUPERINTENDENT with a leading North Midlands Engineering Company. Applicants should have a first-class technical ability and practical knowledge of all aspects of High Grade Iron Foundry production. Initiative and executive ability essential. Superannuation scheme available and assistance will be given with housing. Excellent prospects for the right man but only first-class foundrymen with good knowledge of Shop Management should apply. —Box AA394, FOUNDRY TRADE JOURNAL.

SENIOR FOUNDRY METALLURGIST required. Sound experience in High Duty Irons and Cupola control essential. Must also have practical experience in Sand Control and production of White Heart Malleable. Knowledge of Aluminium, Copper and Yellow Metals would be an advantage. Experience in A.I.D. requirements would also be in applicant's favour. Reply, in confidence, by letter only, stating age, experience and salary required, to: ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, Hill Top Foundry, Smith Road, Wednesbury, Staffs.

PRACTICAL FOUNDRY MANAGER required for Grey Iron Jobbing Foundry in North Manchester area. Weekly production 6 tons. State age and experience. Box PF369, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

SALES REPRESENTATIVE required by progressive Foundry in North-East England. Expanding capacity for Iron and Non-ferrous Castings and Pattern-making. Box SR373, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY MANAGER

BROWN, LENOX & CO. LTD., require a MANAGER for their Steel Foundry at Pontypridd.

Applicants must be experienced in the manufacture of Carbon and Medium Alloy Steel Castings up to 3 tons in weight, and in all aspects of foundry management.

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Apply with full particulars to the Managing Director,

BROWN, LENOX & CO. LTD., Pontypridd, Glamorgan.

FOUNDRY TECHNICIAN required to assist Manager of a 60-ton per week Grey Iron Foundry. Interesting and varied work with good prospects. Send details of education, experience, age and salary required to Box FT402, FOUNDRY TRADE JOURNAL.

ROUTINE ANALYST, age 40/45, required for analysis of cast iron, steel and non-ferrous metals. Knowledge of foundry materials preferred. Capable of working without supervision. Manchester area. Good salary. Pension Scheme, canteen. Box RA401, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER

The services of a suitably qualified person are required for the position of Foundry Manager. Applicants must have full knowledge of the production of carbon and alloy steel, iron and non-ferrous castings and ancillary operations. Experience in the operation of electric arc melting furnaces essential. Applications, stating age and full details of qualifications, etc., should be sent to:—

Secretary,

DEALGAN STEEL FOUNDERS LTD., DUNDALK, IRELAND.

SITUATIONS VACANT—*contd.*

METALLURGIST required to take charge of small Physical and Chemical Laboratory, principally engaged on Aluminium Alloys but some Steel Heat-Treatment control experience preferable. A.I.D. approved would be an added advantage. Excellent conditions and scope, aged 25-40. Please write stating salary required and giving full details of experience to the WORKS MANAGER, Wellworthy Ltd., Ampress Works, Lymington, Hants.

ASSISTANT PLANT METALLURGIST: With Iron and Steel Melting Furnace experience for control of Hot Blast Cupolas and Electric Arc Furnace. Qualifications—at least O.N.C.

METALLURGICAL CHEMIST: With experience in analysis of foundry materials. Required as Senior Assistant for Chemical and Spectrographic Laboratories. Qualifications—H.N.C. or equivalent.

ASSISTANT: Required for shift work in Spectrographic Laboratory. Experience desirable but not essential as training will be given. National Service completed.

All the above are salaried staff appointments. Five-day week, contributory superannuation scheme. Details of qualifications, training, experience, age, etc., should be in writing to the PERSONNEL MANAGER, Ley's Malleable Castings Co. Ltd., Derby.

HAND MOULDER required for small jobbing foundry. Experience of Non-ferrous metals essential. Good wages and conditions. Apply to PERSONNEL DEPARTMENT, E.M.I. Ltd., Blyth Road, Hayes, Middx.

FOREMAN REQUIRED to take charge of shop production of General Iron Foundry in Manchester. Experience of floor moulded castings up to 15 tons essential. Duties will include the supervision and training of apprentices. A salary of £1,000 plus non-contributory pension scheme. Age preferably over 40. Apply in confidence, giving full details. Box FC412, FOUNDRY TRADE JOURNAL.

IRON FOUNDRY with much development work ahead requires PRODUCTION SUPERINTENDENT. Main consideration is ability to lead foremen and operators to achievement of programme within time standard and at low scrap level. Experience on semi-mechanised layouts and with carbon dioxide process a definite advantage. Early advancement probable. Permanent staff appointment. Pension Scheme, etc. Apply in strict confidence to Box IF410, FOUNDRY TRADE JOURNAL.

ADELAIDE, SOUTH AUSTRALIA. FOUNDRY FLUXES & SUPPLIES. LARGE, expanding Wholesale Merchants in Adelaide have vacancy for a married man, age 28 to 35, in the Foundry Supplies Dept.

Experience with wholesale merchants in buying, stock control and in the organisation of selling is required. Experience in a foundry is not sufficient.

Apply for further information, quoting reference "FOUNDRY," to DAVIS, SOPER, LTD., 52 & 54, St. Mary Axe, London, E.C.3.

SITUATIONS VACANT—*contd.*

JUNIOR LABORATORY ASSISTANT required, used to analysis of cast iron. State experience and salary required. North Staffs area.—Box JL391, FOUNDRY TRADE JOURNAL.

ASSISTANT CHEMIST, aged 21-28, required for the Laboratory of an Aluminium Die Casting Shop situated on the South Coast. Please apply in writing, giving full details, to WELLWORTHY LTD., Ampress Works, Lymington, Hants.

MOULDERS skilled floor. Preferably experienced aluminium—good piecework—wanted by firm with heavy order book. Club and canteen facilities. Apply LIGHTALLOYS, LTD., St. Leonards Road, Willesden Junction. Elgar 7191.

FIRST CLASS GENERAL MOULDERS required. Engineering work up to 5 tons. Excellent earnings to first class men. Every possible assistance given with lodgings, etc. Apply JOHN WHEELER & SON, LTD., Railway Foundry, Langley, Birmingham.

FOUNDRY QUALITY CONTROLLER required for light and heavy ferrous and non-ferrous foundry in Lancashire, to be responsible for control of cupolas and non-ferrous furnaces, sand, control, etc. Applicant should have commercial and metallurgical training. The position offers considerable scope to an energetic and capable man. Applications, stating age, experience, qualifications and salary required, to Box FQ413, FOUNDRY TRADE JOURNAL.

TECHNICAL SALES REPRESENTATIVE required for Non-ferrous foundry situated nr. Wolverhampton. Applicants must have knowledge of non-ferrous castings and sales experience, hold a current driving licence. Age 35/45 years. Full details of salary and experience to: TS414, FOUNDRY TRADE JOURNAL.

FOREMAN wanted by West of Scotland Jobbing Foundry. Must be experienced in green/dry sand and loam up to 5 tons. Good prospects and salary. Box W396, FOUNDRY TRADE JOURNAL.

SAND CONTROL TECHNICIAN

AN interesting opportunity occurs for a man who is thoroughly experienced in all aspects of foundry sand control. The position is important, the responsibilities are wide and the prospects in the position are therefore proportionately good. Applicants who consider that their experience of sand control for both Iron and Aluminium of a high standard and who are used to supervisory responsibility should apply, giving details of their past career in strict confidence to Box SC416, FOUNDRY TRADE JOURNAL.

FOREMAN wanted for small non-ferrous jobbing foundry; North London area. Must be fully conversant with the production of intricate castings in all alumininium alloys. Able to control labour. Quote from drawings and work on own initiative.—Box FW417, FOUNDRY TRADE JOURNAL.

EXPERIENCED ESTIMATOR required for Foundry and Pattern Shop work. Some knowledge of Machine Shop estimating would also be beneficial but not essential. Reply giving details of experience and qualifications. State salary required. H. C. HOPPER (NORWICH), LTD., "Norfolk Iron Works," Coslany Street, Norwich, Norfolk. NOR. 82K.

AGENCIES

SMALL iron foundry, grey iron, wishing to expand, requires agent to sell on commission basis.—Full particulars to Box SM393, FOUNDRY TRADE JOURNAL.

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LIVE AGENTS required in several industrial areas in United Kingdom, calling on Foundries, Boiler Houses, etc., to sell Refractories. Right men can earn over £2,500 per annum. Write to: CORROSION LIMITED, Malvern Road, Southampton.

AGENTS

BELGIAN SILICA SANDS & LINOPLAST MOULD & CORE BINDERS: Experienced and qualified agents wanted for the sale of these materials throughout England. Full particulars to: N.G.S., Sicilian House, Southampton Row, London, W.C.1.

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FOR SALE.—One Ballard Drawer Type Core Oven, 6 ft. × 5 ft. × 6 ft., Type E.16. In good working order. Offers. One Semi-muffle Gas Furnace by Kasenit. Offers.—Box FS415, FOUNDRY TRADE JOURNAL.

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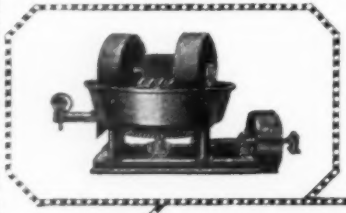

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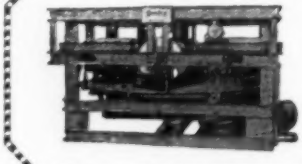

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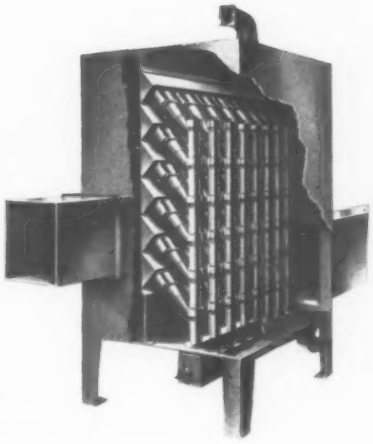

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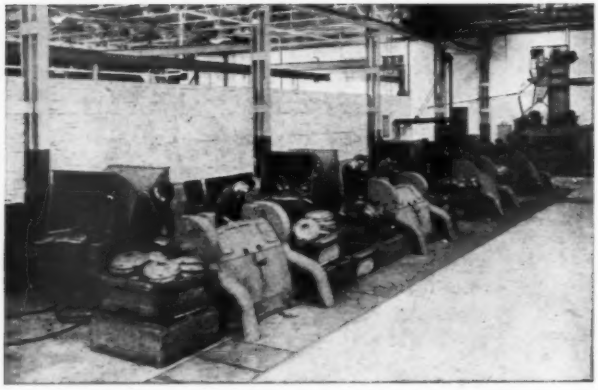

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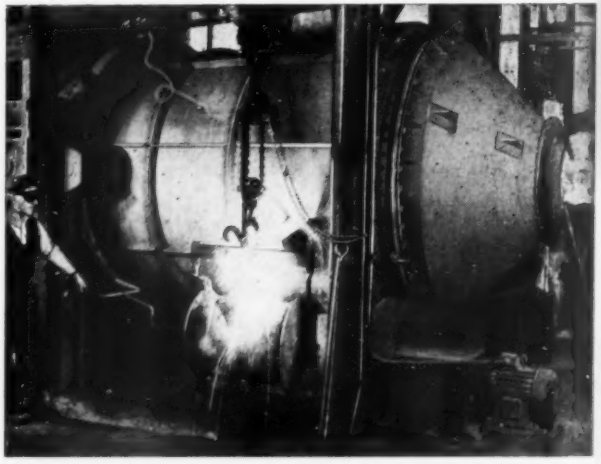

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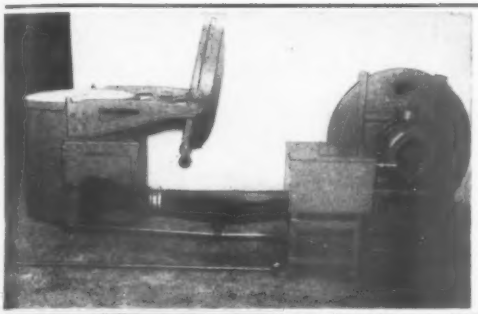

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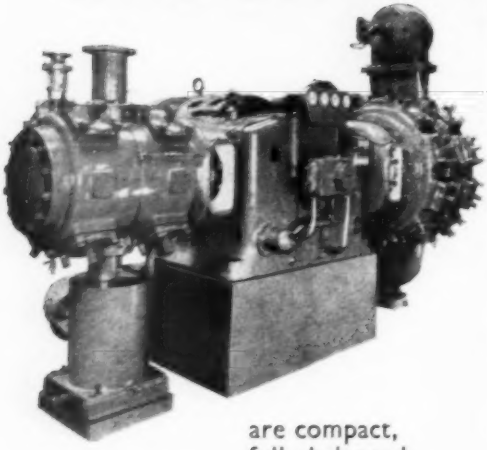

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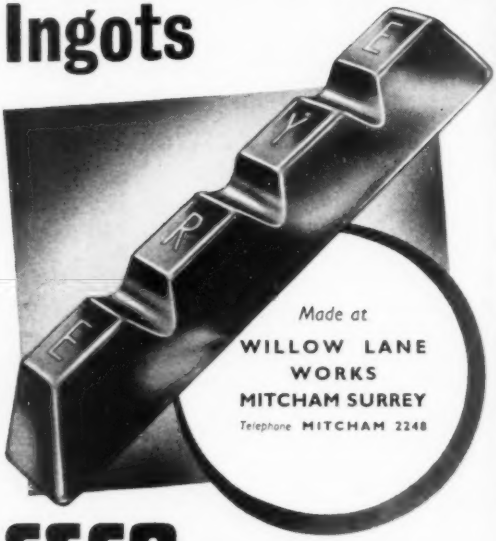

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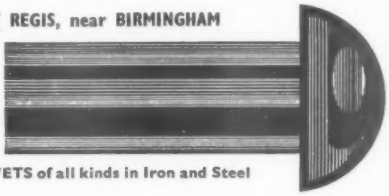

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